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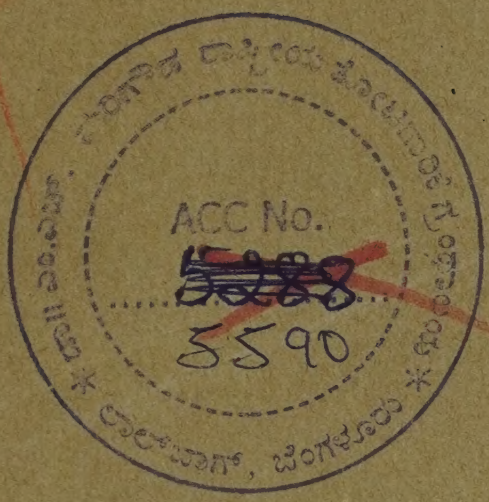

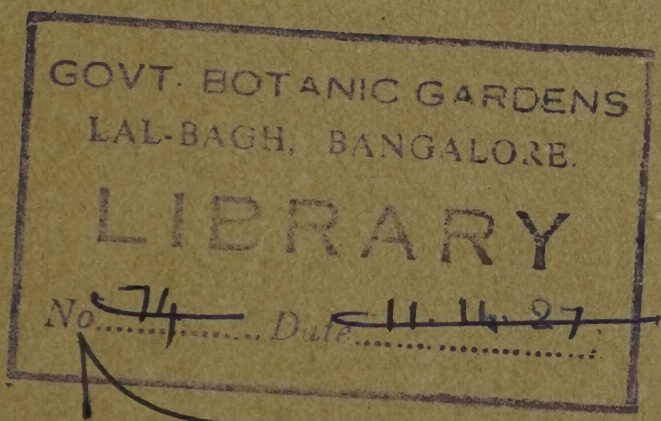

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CATALOGUE

OF THE

EXHIBITS IN THE ECONOMIC PRODUCTS SECTION

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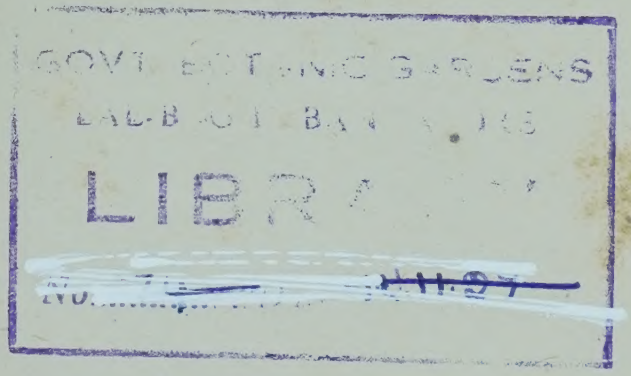

PREFACE.

THE preparation of this catalogue was undertaken by Mr. S. N. Chandrasekhara Ayyar in order to complete the list of the Economic Products exhibited in the Madras Museum, commenced by Mr. Narasinga Rao in 1916 in his "Catalogue of Wood Specimens."

The collection is by no means a complete one. But it cannot be made so until scientific knowledge of such subjects as, for instance, indigenous drugs, has been greatly increased. It is hoped, therefore, that the publication of this list with its compilation of available information about the articles included, may help to stimulate further inquiry. The sources of all information have been indicated in order to facilitate reference for further details.

GOVERNMENT MUSEUM, MADRAS,
1921.

F. H. GRAVELY,
Superintendent.

MYSORE GOVERNMENT MUSEUM,
BANGALORE.
No 10
Date 16-5-52.

INTRODUCTION.

THE Catalogue deals with all the articles in the Economic Section excepting the Wood Specimens which have already been catalogued.

The arrangement is alphabetical according to the scientific name of the article. Wherever possible, popular English names and the chief vernacular names in Hindi, Tamil, Telugu, Kanarese and Malayalam have been given. The distribution, habits and uses, if any, of each exhibit is given as far as it could be ascertained.

The following books have been consulted in the preparation of this catalogue :—

BOOKS CONSULTED.

General.

1. Dictionary of the Economic Products of India. Dr. Watt. (W. H. Allen & Co., 13, Waterloo Place, S.W., London, 1891.)
2. Commercial products of India. Dr. Watt. (John Murray and Sons, Albemarle Street, London.)
3. Bulletins of the Agricultural Research Institute, Pusa. (Thacker, Spink & Co., Calcutta.)
4. The Agricultural Journal of India. (Thacker, Spink & Co., Calcutta.)
5. Handbook of Indian Agriculture. N. Mukherjee. (Thacker, Spink & Co., Calcutta.)
6. Flora of British India. Sir J. D. Hooker. (L. Reeve & Co., 6, Henrietta Street, Covent Garden, W.C., London.)
7. The Flora of the Bombay Presidency. T. Cooke. (Taylor and Francis, Red Lion Court, Fleet Street, London, 1903.)
8. Manual of Indian Timbers. J. S. Gamble. (Sampson Low, Marston & Co., London.)
9. Scientific Reports of the Agricultural Stations and Bulletins of the Department of Agriculture, Madras. (Government Press, Madras.)
10. The Indian Forest Records. (Government Press, Calcutta.)
11. Memoirs of the Geological Survey of India. (Sold at the office of the Geological Survey of India, 27, Chowringee Road, Calcutta.)
12. District Gazetteers of the Madras Presidency. (Government Press, Madras.)

Food.

Food-grains of India. A. H. Church. (Chapman and Hall, London, 1886.)

Oils.

Report on the Oils of South India. Lt. H. P. Hawkes. (Government Press, Madras.)

Drugs.

Medicinal Plants of India by Lt.-Col. K. R. Kirtikar and Major B. D. Basu. (Published by Sudhindra Nath Basu, M.B., Panini office, Allahabad, India.)

The useful plants of India. Col. H. Drury. (W. H. Allen & Co., 13, Waterloo Place, S.W., London.)

Fibres.

The Fibrous Plants of India, fitted for cordage, clothing and paper. J. F. Royle. (Smith, Taylor & Co., Bombay, 1855.)

Report on the Fibres of Southern India. (Government Press, Madras, 1856.)

Gums and Resins.

Report on the Gums, Resins, Oleo Resins and Resinous Products in the Indian Museum. M. C. Cooke. (Indian Museum, India Office, Calcutta.)

Rubber.

Cultivation and Preparation of Para Rubber. W. H. Johnson. (Crosby, Lockwood & Sons, 7, Stationer's Hall, Court, Ludgate Hill, London.)

Cultivation of Ficus Elastica. C. Bald. (Thacker, Spink & Co., Calcutta.)

Sericulture.

A bird's eye view of Indian Sericulture. N. G. Mukherjee. (Thacker, Spink & Co., Calcutta.)

Madras Pencils.

Bulletins issued by the Department of Industries, Madras. (Government Press, Madras.)

Glass.

Bulletins issued by the Department of Industries, Madras. (Government Press, Madras.)

Saltpetre.

Agricultural Research Institute, Pusa. Bulletin No. 68. (Government Press, Calcutta.)

Woollen Blanket.

Monograph on the Woollen Fabric Industry in the Madras Presidency. E. Thurston. (Government Press, Madras.)

Dyes and Tans.

Memorandum on Dyes of Indian growth and production. By L. Liotan. (Calcutta: Home, Revenue and Agricultural Department, Press, 1881.)

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LIST OF ABBREVIATIONS.

N.O.	Natural Order.
Hind.	Hindi.
Tam.	Tamil.
Tel.	Telugu.
Kan.	Kanarese.
Mal.	Malayalam.
Dr. Watt's Dy.	Dr. Watt's Dictionary of Economic Products.
Dr. Watt's Comm. Prods. ...	Dr. Watt's Commercial Products of India.
Rep. on Fib.	Report on Fibres of Southern India.
Royle	Royle's Fibrous Plants of India.
Gamble Timbers	Manual of Timbers by Gamble.
Muk.	Mukherjee's Handbook of Indian Agriculture.
Hawkes	Report on Oils by Hawkes.
K. & B.	Kirtikar and Basu's Medicinal Plants of India.
K.	Kirtikar.
Drury	Drury's useful plants of India.
A. H. Church	Food-grains of India by A. H. Church.

CATALOGUE OF THE EXHIBITS IN THE ECONOMIC PRODUCTS SECTION EXCEPT WOOD SPECIMENS.

INDEX COLLECTION OF TYPICAL ECONOMIC PRODUCTS.

Abies Webbiana, *Lindl.* Himalayan Silver Fir. N.O. Coniferæ.
Leaves, p. 36.

Abroma agusta, *Linn.* Devil's Cotton. N.O. Sterculiaceæ.
Fibre, p. 133. Root bark, p. 36.

Abrus precatorius, *Linn.* Indian or Wild Liquorice. N.O. Leguminosæ.
Seed, p. 36. Root bark, p. 36.

Abutilon indicum, *G. Don.* Country Mallow. N.O. Malvaceæ.
Fibre, p. 133. Seed, p. 36.

Acacia arabica, *Willd.* Babul. N.O. Leguminosæ.
Gum, p. 115. Pods, p. 100. Leaves, p. 100. Bark, p. 100.

Acacia catechu, *Willd.* N.O. Leguminosæ.
Resinous extract, p. 100. Used in tanning; also employed in medicine. Bark, p. 100. Wood, p. 100.

Acacia concinna, *D.C.* N.O. Leguminosæ.
Pods, p. 37. Detergent.

Acacia Farnesiana, *Willd.* Cassie Flower Tree. N.O. Leguminosæ.
Gum, p. 116. Bark, p. 100. Pods, p. 100.

Acacia ferruginea, *D.C.* N.O. Leguminosæ.
Bark, p. 37. Gum, p. 116.

Acacia leucophlœa, *Willd.* N.O. Leguminosæ.
Fibre, p. 133. Leaves, p. 101. Pods, p. 101. Both pods and leaves are also used as food.

Acacia planiformis, *W. & A.* N.O. Leguminosæ.
Fibre, p. 134.

Acacia Sundra, *D.C.* N.O. Leguminosæ.
Gum, p. 116.

Acalypha fruticosa, *Forsk.* N.O. Euphorbiaceæ.
Tam. Sinnimaram. *Tel.* Chinniāka.
A bush, 4 to 8 feet high, common in South India and Ceylon. Leaves used as a cure for cholera, etc.

Achyranthes aspera, *Linn.* N.O. Amaranthaceæ.
Leaves, p. 37. Spikes, p. 37. Ashes, p. 101.

Acipenser huso, *Linn.* N.O. Pisces.

Tam. Min-Vajjaram. *Tel.* Chēpa-Vajramu.
Hind. Machchhi-Kā-Sirish.

A sturgeon, inhabiting the Caspian and Black Seas. The swim-bladder is cut up into shreds forming the isinglass of commerce; insoluble in cold water, but soluble in boiled water and on cooling forms a good jelly; used in medicine; demulcent and nutritive. (Watt's Dy.)

Aconitum ferox, *Wall.* N.O. Ranunculaceæ.
Root, p. 37.

Aconitum heterophyllum, *Wall.* N.O. Ranunculaceæ.
Root, p. 38.

Acorus calamus, *Linn.* N.O. Aroideæ.
Rhizome, p. 38.

Actiniopteris dichotoma, *Bedd.* N.O. Filices.
See under Medicinal Drugs, p. 38.

Adansonia digitata, *Linn.* N.O. Malvaceæ.
Fruit, p. . "The fruit has a mucilaginous pulp, having a pleasant, cool, subacid taste, like cream of tartar"; "a good refrigerant in fever"—(*Bomb. Gaz.*, VI, 14). Bark, p. 38.

Adhatoda Vasica, *Nees.* N.O. Acanthaceæ.
Leaves, p. 38.

Adenanthera pavonia, *Linn.* N.O. Leguminosæ.
Seeds yield an oil.

Ægle Marmelos, *Corr.* N.O. Rutaceæ.
Rind of fruit, p. 38. Root bark, p. 38. Pulp of fruit, p. 38. Stem bark, p. 101. Fruit, p. 38.

Aeschynomene aspera, *Linn.* N.O. Leguminosæ.

Tam. Takke or Sadai. *Tel.* Bendu.

A small subfloating bush, common all over South India. The pith is used for hats, and ornamental pith work such as models of temples, houses, garlands, etc.

Agave americana, *Linn.* N.O. Amaryllideæ.
Fibre, p. 134. Rope, p. 134. Root said to be used in medicine. Leaves, p. 134.

Ailanthus malabarica, *D.C.* N.O. Simarubeæ.
Bark, p. 39.

Alangium Lamarckii, *Thw.* N.O. Cornaceæ.
Root bark, p. 39.

Albizzia amara, *Boivin.* N.O. Leguminosæ.
Gum, p. 116. Leaves and pods form a substitute for soap.

Albizzia Lebbek, *Benth.* N.O. Leguminosæ.
Seeds, p. 39.

Albizzia lophantha, *Benth.* N.O. Leguminosæ.
Bark, p. 101.

Albizzia procera, *Benth.* N.O. Leguminosæ.
Bark, p. 101.

Allium cepa, *Linn.* Onion. N.O. Liliaceæ.
Seeds, red variety, p. 27. Bulbs, p. 92. Also used in Indian medicine.

Allium sativum, *Linn.* N.O. Liliaceæ.
Bulbs, pp. 39, 92.

Aloe perryi, *Baker* and **Aloe succotrina,** *Linn.* The Socotrine Aloes. N.O. Liliaceæ.

Hind. Musabbar, ilva, yalva. *Tam.* Kariya polam.
Tel. Mushāmbaram. *Mal.* Chennanayakam.

Alæ succotrina is indigenous to South Africa and *Alæ perryi* is peculiar to Socotra. *A. succotrina* is more woddy than *A. perryi* and is often 6 ft. high. The drug aloes which is prepared from the juice of the leaves is stomachic and tonic in small doses and in large doses purgative and indirectly emmenagogue. (Watt's Dy.)

Aloe vera, *Linn.* N.O. Liliaceæ.

Hind. Ghi-karār kumari. *Tam.* Kattalai, Shotu-kattalai.
Tel. Kalabanda. *Kan.* Lola-sora.
Mal. Kattru vazgha or kattala.

The plant is a native of North Africa. Many sub-varieties of this are cultivated in South India and many now grow wild on the coasts of South India. The fresh juice from the leaves is said to be cathartic cooling and useful in fever, spleen and liver disease, enlarged lymphatic glands, etc. The inspissated juice from the forms of this species is regarded as but little inferior to the imported Socotrine aloes. It is an aperient and administered to persons predisposed to apoplexy. (Watt's Dy.)

Alpinia galanga, *Wilid.* N.O. Scitamineæ.
Rhizome, p. 40.

Alpinia officinarum, *Hance.* N.O. Scitamineæ.
Rhizome, p. 40.

Alum.

Tam. and *Tel* Pati-karam. *Kan.* Patikara.
Mal. Patik-Karam.

Alum is obtained in India from alum shale in Behar, Cutch and the Punjab. It is often met with in different shades of colour—white, yellow, red and black depending upon impurities. Ref. *Bombay Gazetteer,* Vol. V, pp. 19—20, for an account of the manufacture of alum in Cutch. It is used as a mordant in dyeing especially with madder and turmeric. It is also used by Indian physicians for its astringent styptic and antiseptic properties. (Watt's Dy.)

Amarantus spinosus, *Linn.* N.O. Amarantaceæ.
Root, p. 40. Ashes used in medicine.

Ammania baccifera, *Linn.* N.O. Lythraceæ.
Plant, p. 40.

Ammonium chloride.
Hind. Nou-sādar. *Tam.* Nava-charum.
Tel. Nava-sagaram, nava-charum. *Mal.* Nava saram.

This substance is manufactured to a large extent in the Punjab and used in tinning and forging metals. In South India also it is used in these ways. Also used in the formation of freezing mixtures. Also used in medicine, in cases of headache, cold, etc. (Watt's Dy.)

Anacardium occidentale, *Linn.* N.O. Anacardiaceæ.
Gum, p. 117. Nuts, p. 27. Bark is used in tanning.

Anamirta cocculus, *W. & A.* N.O. Menispermaceæ.
Berries, p. 40.

Andrographis paniculata, *Nees.* N.O. Acanthaceæ.
Plant, p. 40.

Andropogon muricatus, *Retz.* Cuscus, Khus-khus. N.O. Gramineæ.
Tam. Ilamicha ver, Vetti ver. *Tel.* Vatti veru, lamajjakanuver.
Kan. Lāvancha. *Mal.* Vetti ver.
Hind. Khas.

A perennial tufted grass very common in every part of the Coromandel Coast, Mysore and on the banks of the water-courses in the interior. The roots when distilled with water yields a fragrant oil which is used as a perfume. An infusion of the roots is given as a febrifuge and a powder in bilious complaints. (Watt's Dy.)

Andropogon sorghum, *Roxb.* N.O. Gramineæ.
Grains, pp. 77—79.

Anisochilus carnosus, *Wall.* N.O. Labiatæ.
Leaves, p. 40.

Anisomeles malabarica, *R.Br.* N.O. Labiatæ.
Plant, p. 41. Leaves, p. 41.

Anogeissus latifolia, *Wall.* N.O. Combretaceæ.
Gum, p. 117. Leaves, p. 102.

Anona reticulata, *Linn.* The Bullock's Heart. N.O. Anonaceæ.
Hind. Louna, ram-phal. *Tel.* Rāmāpandu. *Tam.* Ram Sita.

A small tree, very common all over South India. The dry unripe fruit yields a black dye.

Anona squamosa, *Linn.* Custard apple. N.O. Anonaceæ.
Root, pp. 41, 96.

Antiaris toxicaria, *Leschen.* Upas tree. N.O. Urticaceæ.
Bark, p. 135.

Anthocephalus Cadamba, *Benth & Hook. f.* N.O. Rubiaceæ.
Bark, p. 41.

Antimonium.

Tam. Anjanakkallu. *Tel.* Anjanrayi.
Mal. Annana kolu.

A black antimony ore, a bisulphide and called surma. Occurs in various parts of the Punjab. Used as a cosmetic for the eye. Its use as a metal has not been understood by the Indians. Also supposed to act as a tonic to the eye and to strengthen the sight.

Aponogeton monostachyum, *Thunb.* N.O. Naiadaceæ.

Hin. Ghecu. *Tam.* Kotti-katang or Kotti-kizhangu.
Tel. Kotti-gadda nama.

A native of shallow, standing fresh water in Bengal which appears during the rains. The roots are eaten as food. Said to be as good as potatoes.

Arachis hypogæa, *Linn.* N.O. Leguminosæ.
Fruits, p. 28.

The following varities are exhibted :—

1. Madagascar groundnuts. 2. Raipur groundnuts. 3. Transvaal. 4. Barbados : Ceylon. 5. Big Japanese. 6. Senegal groundnuts. 7. Mauritius. 8. Mauritius : Ceylon. 9. Virginian groundnuts. 10. Tata's groundnuts. 11. West African groundnuts.

Areca catechu, *Linn.* Arecanut, pp. 102, 117. N.O. Palmæ.

The nuts are used for chewing with betel leaves. Practically every native of India chews and so the arecanuts form a very important article of commerce.

The following are exhibited :—

1. From Kadur, Mysore. 2. From Bombay.

Arecanut dyed—1. Goribidnur, Mysore. 2. Trivandrum. 3. Shimoga, Mysore. 4. Kadur, Mysore. 5. Yedatore, Mysore.

Argemone mexicana, *Linn.* N.O. Papavaraceæ.
Plant, p. 28. Seeds, p. 41.

Argyreia speciosa, *Sweet.* N.O. Convolvulaceæ.
Root, p. 41.

Aristolochia bracteata, *Retz.* N.O. Aristolochiaceæ.
Plant, p. 42.

Aristolochia indica, *Linn.* N.O. Aristolochiaceæ. Root, p. 42.

Arsenicum album.

Hind. Sanbul-khar, safed sambul, sankhya. *Tam.* Vellai pashanam.
Tel., Kan. and *Mal.* Shenka pazhanam.

Mentioned in the Indian Pharmacopœia that this substance is alterative, tonic and antiperiodic and poisonous in large doses. Has been found highly useful in many complaints. (Watt's Dy.)

Arthrocnemum indicum, *Moq.* N.O. Chenopodiaceæ.
Ash or Barilla, p. 102. Leaves are used as famine food.

Artocarpus integrifolia, *Linn.* N.O. Urticaceæ.
Unripe fruit, pp. 42, 96. Leaves, p. 42. Root, p. 42. Wood, p. 102.

Asbestos copper rings.

Mar. Shankha palita.

Asbestos is a fibrous mineral which is really a variety of Hornblende. Allied to augite, tremolite, in which the proportion of alumina is less than usual. Found in connexion with serpentine and contains a large quantity of magnesia. There are many varieties of asbestos, some being silky in appearance and touch. Asbestos is found in the Gokak taluk in the Belgaum district in the Southern Mahratta country where it is used as an external application for ulcers, sores, etc. Asbestos is of course chiefly used as a fire proof in buildings, machines, etc. (Watt's Dy.)

Asparagus racemosus, *Willd.* N.O. Liliaceæ.
Roots, p. 42.

Asparagus sarmentosus, *Willd.* N.O. Liliaceæ.
Roots, p. 42.

Averrhoa Carambola, *Linn.* N.O. Geraniaceæ.
Fruits, p. 42.

Avicennia officinalis, *Linn.* N.O. Verbenaceæ.
Bark and wood, p. 102.

Azima tetracantha, *Lam.* N.O. Salvadoraceæ.
Root, p. 43.

Balanites Roxburghii, *Planch.* N.O. Simarubeæ.
Fruit, p. 43. Seeds, p. 43.

Balsamodendron Mukul, *Hook.* N.O. Burseraceæ. Gumgugal.
Gum, p. 117.

Bambusa arundinacea, *Retz.* N.O. Gramineæ.
Leaves, p. 130. The leaves are supposed to have emmenagogue properties. The leaves are also used in veterinary medicine by the natives. Tabashir, p. 43. Seeds used as food.

Barleria Prionitis, *Linn.* N.O. Acanthaceæ.

Hind. Kat sareya. *Tam.* Shemmuli, varamulli.
Tel. Mulu-goranta.

A small spiny bush with plentiful buff-coloured flowers, very common all over South India, especially in the hedges in Madras. The juice of the leaves is used as a diaphoretic and expectorant by natives. (Surgeon-General George Bidie, C.I.E., Madras.)

Barringtonia racemosa, *Blume.* N.O. Myrtaceæ.

Hind. Ijjul. *Tam.* Sámudra, cuddapah.

A moderate-sized evergreen tree, common on the coast both on the eastern and western sides of South India. The root resembles cinchona in medicinal virtues.

Bassia latifolia, *Roxb.* N.O. Sapotaceæ.

Root, p. 103. Oilcake, p. 29. Seeds, p. 43. Kernel, p. 29.

Bauhinia parvifolia, *Teys & Bend.* N.O. Cæsalpineæ.

Fibre, p. 135.

Bauhinia racemosa, *Lamk.* N.O. Cæsalpineæ.

Fibre, p. 135.

Bauhinia vahlii, *W. & A.* N.O. Cæsalpineæ.

Fibre, p. 136.

Bauhinia variegata, *Linn.* N.O. Cæsalpineæ.

Bark, p. 103.

Benincasa cerifera, *Savi.* The White Gourd Melon. N.O. Cucurbitaceæ.

Seeds, p. 43.

Berberis aristata, *D.C.* N.O. Berberideæ.

Root, p. 103.

Berberis nepalensis, *Spreng.* N.O. Berberideæ.

Stem, p. 103.

Bixa orellana, *Linn.* N.O. Bixineæ.

Fruit, p. 103. Seeds, p. 103.

Bœrhaavia diffusa, *Linn.* The Spreading Hog-weed. N.O. Nyctagineæ.

Hind. Sánt. *Tam.* Mukaratte-kire.

Tel. Atika mamidi.

A common weed, all over South India, especially in the walls, corners, etc. The root, used in infusion or given in powder, acts as a laxative, diuretic, anthelmintic and cooling medicine.

Bombax malabaricum, *D.C.* N.O. Malvaceæ.

Flower buds—flower buds are eaten as a pot herb. Cotton, p. 136. Bark, p. 118. Gum, p. 118. Flower—the flowers are used with other ingredients in cases of hæmorrhoids.

Borassus flabellifer, *Linn.* N.O. Palmæ.

Gum, p. 118. Fibre, p. 136. Ashes—the ashes of the dry spadix are used in medicine for heart burn and spleen troubles. Seedlings, p. 96. Roots—roots are regarded as cooling and restorative. Stones—the stones are split open and the soft albuminous layer of the seed with the liquid contents are eaten. These are considered to be cooling and refreshing. Buds—buds are regarded as diuretic and tonic. Flour—flour is made from the large embryo in the germinated seed and made into cakes, etc. (Watt's Dy.)

Borax.

Hind. Sohāgā, tinkāl. *Tam.* Vengaram.
Tel. Velligaram. *Kan.* Biligara.
Mal. Pongaram.

Borax is not obtained in South India. The borax sold in the market is all from Northern India from places like Punjab, Kashmir, Simla, etc. Borax is an exceedingly useful article. Used as a mordant in dyeing, especially in calico printing along with turmeric. It is put to a number of uses in medicine. To mention a single case, it is used as an antiseptic lotion and as a stimulating wash for hot eruptions in the body and scaly skin diseases. Also used in the industries in several ways as for example in the glazing of chinaware, etc., in the process of soldering oxidisable metals, etc. (Watt's Dy.)

Boswellia serrata, *Roxb.* N.O. Burseraceæ.
Resin, p. 118.

Brassica alba, *H.F. & T.T.* White Mustards, p. 29. N.O. Cruciferæ.

Brassica juncea, *H.K.F. & T.* Indian Mustard, pp. 29, 44. N.O. Cruciferæ.

Bruguiera gymnorhiza, *Lam.* N.O. Rhizophoreæ.
Bark, p. 104.

Buchanania latifolia, *Roxb.* N.O. Anacardiaceæ.
Seeds, p. 29. Bark, p. 104. Gums, p. 118.

Butea frondosa, *Roxb.* N.O. Leguminosæ.
Flower, p. 104.

The flowers are used in medicine for their astringent, diuretic and aphrodisiac properties.

Cæsalpinia Bonducella, *Fleming.* N.O. Leguminosæ.
Seeds, p. 44.

Cæsalpinia Coriaria, *Willd.* N.O. Leguminosæ.
Pods, p. 104.

Cæsalpinia pulcherrima, *Swartz.* N.O. Leguminosæ.
Flowers, p. 44. Leaves, p. 44.

Cæsalpinia sepiaria, *Roxb.* N.O. Leguminosæ.
Bark, p. 105.

Cajanus indicus, *Spreng.* N.O. Leguminosæ.
Seeds, p. 88. Split, seed, p. 88.

Calophyllum inophyllum, *Linn.* N.O. Guttiferæ.
Seeds, p. 44. Bark regarded as astringent and fit to be used for internal hæmorrhage.

Calophyllum Wightianum, *Wall.* N.O. Guttiferæ, p. 30.
Seeds are also used as food.

Calotropis gigantea, *Br.* N.O. Asclepiadeæ.

Fibre, p. 137. Root bark, p. 44. Manna, the plant, is said to yield a sugar or manna in Arabia and Persia but it is doubtful if it secretes it in India. Rubber, the milky juice, yields a kind of rubber. Cotton, p. 138.

Camellia theifera, *Griff.* N.O. Ternstrœmiaceæ.

Leaves, pp. 75, 76.

Cananga odorata, *H.F. & T.T.* The Ilang Ilang. N.O. Anonaceæ.

Yields Otto of Ilang; it is a scented oil.

Canarium strictum, *Roxb.* N.O. Burseraceæ.

Gums, pp. 44, 119.

Canavalia ensiformis, *D.C.* N.O. Leguminosæ.

Tam. Thambatan Kai. *Tel.* Tambattan Kaya.
Kan. Tumbay Kai. *Hind.* Suféd.

Pods and seeds.

A climber as many of the Leguminosæ. There are at least three varieties of it cultivated all over South India. The tender pods as well as the ripe seed are used as food by all classes of people in South India. (Watt's Dy.)

Cannabis sativa. *Linn.* Indian Hemp, N.O. Urticaceæ.

Seeds, p. 45. Seeds are used as food. Resin is used in medicine.

Capparis horrida, *Linn.* N.O. Capparideæ.

Tam. Atanday, Katallikai. *Tel.* Adonda, Arudonda.
Hind. Ardanda.

Fruits.

A climbing thorny shrub common all over the hot districts of South India, especially along hedges and on hills. The fruits are eaten by the people of Northern India and less commonly by the people of South India. (Watt's Dy.)

Capsicum frutescens, *Linn.* N.O. Solanaceæ.

Fruits, p. 45.

Capsicum grossum, *Willd.* N.O. Solanaceæ.

Fruits, p. 97.

Carapa moluccensis, *Lam.* N.O. Meliaceæ.

Bark, p. 45. Seeds yield an oil fit for illumination or for application to the hair.

Carbon.

Tam. Kari. *Tel.* Boggu.
Kan. Iddallu. *Hind.* Koyelah.
Mal. Kari.

(1) Charcoal of Chloroxylon Swietenia, Madras. (2) Charcoal of Acacia melanoxylon, Madras. (3) Charcoal of Eucalyptus globulus. Charcoal is chiefly used as fuel. It is also used for filtering purposes. Many of the Madras Presidency people make tooth powder from charcoal. It is also employed in medicine, etc.

Carthamus tinctorius, *Linn.* N.O. Compositæ.
Flower heads, seeds and oil cake, pp. 30, 45, 105.

Carum Carni, *Linn.* N.O. Umbelliferæ.
Fruits, pp. 46, 93.

Carum copticum, *Benth.* N.O. Umbelliferæ.
Fruits, pp. 46, 93.

Carum nigrum, *Roxb.* N.O. Umbelliferæ.
Fruits, p. 46.

Caryota urens, *Linn.* N.O. Palmæ.
Leaves, fibres, seeds, p. 138.

Cassia alata, *Linn.* Leguminosæ.
Leaves, p. 46.

Cassia angustifolia, *Vahl.* Leguminosæ.
Leaves, p. 47.

Cassia auriculata, *Linn.* Tanner's Cassia. N.O. Leguminosæ.
The root is used for tempering iron. Flower buds, flowers and seeds, p. 47. Root bark and bark, pp. 47 and 105.

Cassia fistula, *Linn.* N.O. Leguminosæ.
Fruits used medicinally. Bark, p. 106.

Cassia Sophora, *Linn.* N.O. Leguminosæ.
Leaves, p. 47.

Cassia Tora, *Linn.* N.O. Leguminosæ.
Leaves, p. 47. Seeds, p. 47.

Castanospermum australe, *A. Cunn.* N.O. Leguminosæ.
A native of Australia and an introduced plant of India. The seeds of the tree are eaten as food by the natives of Australia. (Watt's Dy.)

Casuarina equisetifolia, *Forst.* N.O. Casuarianeæ.
Bark, p. 47.

Celastrus paniculata, *Willd.* N.O. Celastrineæ.
Seeds, p. 48.

Cera alba and flava.
Wax, p. 126.

Cheilanthus mysorensis, *Wall.* N.O. Filices.
Gums, p. 48.

Chloroxylon Swietenia, *D.C.* N.O. Meliaceæ.
Leaves, p. 48. Bark, p. 48.

Cicer arietinum, *Linn.* N.O. Leguminosæ.
Chick Pea. Seeds, p. 88.

Cinchona. Cinchona officinalis. N.O. Rubiaceæ. Bark, p. 48

Cinnamomum iners, *Reinw.* N.O. Laurineæ.
Bark, p. 48.

Cinnamomum zeylanicum, *Breyn.* N.O. Laurineæ
Bark, p. 49

Cissampelos Pareira, *Linn.* N.O. Menispermaceæ.
Root, p. 49.

Citrus aurantium, *Linn.* N.O. Rutaceæ.
Rind of fruit, p. 49.

Citrus medica, *Linn.* Var. acida. N.O. Rutaceæ.

Hind. Limbu, limu. *Tam.* Elimitchum pazham.
Tel. Nimma pandu. *Kan.* Nimbe-hannu.
Mal. Cheru-naranna.

A shrub or a small tree with leaves containing oil glands. A native of the Himalayas and cultivated all over South India. Supposed to be very good for bilious complaints, disorders of the mind, etc. Therefore largely used by the Ayurvedic practitioners. (Watt's Dy.) Also used in Indian houses in cookery. Also largely used as a pickle.

Cleome viscosa, *Linn.* N.O. Capparideæ.
Plant, p. 49. Seeds, p. 49.

Clerodendron serratum, *Spreng.* N.O. Verbenaceæ.
Leaves, p. 50. Roots, p. 50.

Clitoria Ternatea, *Linn.* N.O. Leguminosæ.
Roots, p. 50. Seeds, p. 50.

Coccus cacti, *Linn.* N.O. Hemiptera.
Female insects, Cochineal dye, p. 106.

Coccus lacca, *Kerr.* On Schlichera trijuga, *Willd.*; on Zizyphus jujuba, *Lamk*; on Ficus religiosa, *Linn.*
Sealing wax, p. 113.

Cochlospermum gossypium. *Kath.* N.O. Bixineæ.
Bark, p. 50. Seeds.
The seeds yield an oil for which no use has been yet satisfactorily found.

Cocos nucifera, *Linn.* N.O. Palmæ.
Articles from—1. Snuff bottle, 2. Gum, 3. Roots, 4. Dried kernel, pp. 139, 155.

Coix Lachryma jobi, *Linn.* N.O. Gramineæ.
Met with on the plains of India. More common in Punjab and Burma. The seeds are used as food grains by hill tribes and for ornamental purposes by aboriginal tribes.

Collocalia nidifica, *Gray.* N.O. Macrochires.
The Indian edible nest swiftlet. Found in the neighbourhood of Malabar Coast, common on the higher hills, Nilgiris, Anamalais, etc. The nests of this bird, found in caves in the hills of Southern India and islands of the Malabar Coast, are small shallow cups, made of grass, mess and feather, and cemented together by inspissated Saliva. Supposed to be very nourishing. (See Fauna of British India Birds, Vol. 3.)

Combretum ovalifolium. *Roxb.* N.O. Combretaceæ.
Gum, p. 119.

Corallium Sp., *Coral.* N.O. Octactinia.

Hind. Murjan, Mūnga. *Tam.* Pavalam, Nuraikal.
Tel. Pāgādam. *Kan.* Havala.

The red coral of commerce (Coraliium Sp.) is obtained from the skeleton of organisms that form colonies. Pieces of the coral have been obtained on the Pāmban Coast. The coral is made into beads which are used as ornaments. Also used in medicine.

Cordia myxa, *Linn.* N.O. Borragineæ.

Bark, p. 140. Fruits. The fruits are eaten by the natives and also pickled.

Corallocorpus epigæa, *Hook. f.* N.O. Cucurbitaceæ.

Tubers, p. 50.

Coriandrum sativum, *Linn.* N.O. Umbelliferæ.

Fruits, p. 50.

Corypha umbraculifera, *Linn.* Talipot-palm. N.O. Palmæ.

Tam. Tali panai, Kottaip-panai. *Tel.* Shritalam.
Mal. Kotap-pana. *Kan.* Shritale, tale.

A large common tree in the moist regions of the Madras Presidency and in Malabar. The pith yields a kind of sago. The leaves are used very much like the leaves of the palmyra for fans, umbrellas, etc. The leaf stalks yield a strong fibre. (Gamble's Timbers.)

Crinum asiaticum, *Linn.* N.O. Amaryllideæ.

Root, p. 51.

Crotalaria juncea *Linn.* N.O. Leguminosæ.

Fibre, p. 140.

Croton Tiglium, *Linn.* N.O. Euphorbiaceæ.

Seeds, p. 51.

Cucumis Melo, *Linn.* N.O. Cucurbitaceæ.

Seeds, p. 51.

Cucumis sativus, *Linn.* N.O. Cucurbitaceæ.

Seeds, p. 52.

Cucurbita maxima, *Duchesne.* N.O. Cucurbitaceæ.

Seeds, p. 52.

Cuminium cyminum, *Linn.* N. O. Umbelliferæ.

Fruits, p. 52.

Cupri sulphas.

Hind. Nīlā-thūtha, nīltā-tutiya. *Tam.* and *Tel.* Mayil tuttam.
Kan. Mayil tutya. *Mal.* Mayil tutta.

Sulphate of copper is prepared by roasting copper pyrites. The latter are available in South India. The sulphate of copper is used by Indian practitioners to a very large extent. (Watt's Dy.)

Curcuma amada, *Roxb.* Mango Zingiber. N.O. Scitamineæ.

Rhizome, p. 52.

Curcuma angustifolia, *Roxb.* Wild Arrowroot. N.O. Scitamineæ.

Hind. Tikhur. *Tam.* Ararūt-Kizhangu.
Tel. Ararût gaddalu.

Common all over India. This was largely cultivated in the Madras Agricultural Farm at Saidapet. A fairly good quality of arrowroot is said to be produced from the rhizomes. The arrowroot is largely manufactured at Cochin, Travancore and Kanara. It is also found wild in the hills of Vizagapatam and Ganjām districts. (Watt's Dy.)

Curcuma aromatica, *Salisb.* N.O. Scitamineæ.
Rhizome, p. 52.

Curcuma longa, *Roxb.* Turmeric. N.O. Scitamineæ.
Rhizome, p. 52.

Cyperus rotundus, *Linn.* N.O. Cyperaceæ.
Roots, p. 53. Also used in certain dye preparations to impart a perfume to the fabric. (Watt's Dy.)

Dæmia extensa, *R. Br.* N.O. Asclepiadeæ.
Leaves, p. 53.

Dalbergia lanceolaria, *Linn.* N.O. Leguminosæ.
Bark, p. 53.

Dalbergia Sisoo, *Roxb.* N.O. Leguminosæ.

Hind. Sisam, Sisu. *Tam.* Yette, Nukku, Kattai.
Tel. Sissi, Karra. *Kan.* Biridi.

A large deciduous tree of Northern India and cultivated in many other places in India. An oil is obtained from the seeds. (Watt's Dy.)

Dammara Australis, or Agathis Dammara, *Rich.* N.O. Coniferæ.
It is a large tree of the Malay and Philippine islands. It yields dammar, a resin largely used in Varnish making, etc. (Willis' Flowering Plants and Ferns of India Camb. Biology Series.)

Dammara orientalis, *Lamb,* or **Agathis Australis,** *Salisb.* N.O. Coniferæ. This is the Kauri pine of New Zealand. It yields a resin which is called the Kauricopal or dammar; the best pieces are dug out of the soil often at a distance from any tree now living. (Willis' Flowering Plants and Ferns of India. Camb. Biology Series.)

Datura fastuosa, *Var Alba.* N.O. Solanaceæ.
Leaves, p. 53. Seeds, p. 53.

Dendrocalamus strictus, *Nees.* N.O. Gramineæ. Tabashir, p. 53.

Diospyros melanoxylon, *Roxb.* Coromandel Ebony. N.O. Ebenaceæ.

Hind. Tendu, Vendu, Temru, Abnus. *Tam.* Tumbi, Tumbali.
Tel. Tumi, Tumki, Tumida. *Kan.* Balai.

A large or small deciduous tree, common in the dry forests of the Mahratta Country, Deccan and the Carnatic, especially on the dry rocky hills of these places. The fruits are ripe in summer and are eaten largely by the natives. (Watts' Dy.)

Dodonea viscosa, *Linn.* N.O. Sapindaceæ.
Leaves, p. 54.

Dolichos biflorus, *Linn.* N.O. Leguminosæ.
Horse Gram, p. 88.

Dolichos lablab, *Linn.* N.O. Leguminosæ.
Seeds, p. 89.

Dolichandrone falcata, *Seem.* N.O. Bignoniaceæ.
Fibre, p. 141.

Ehretia buxifolia, *Roxb.* N.O. Borragineæ.
Roots, p. 54.

Elædendron glaucum, *Pers.* N.O. Celastrineæ.
Gum, p. 119.

Elephantopus scaber, *Linn.* N.O. Compositæ.
Plant, p. 54.

Elettaria Cardamomom, *Maton.* N.O. Scitamineæ.
Capsules, p. 54.

Eleusine coracana, *Gaertn.* N.O. Gramineæ.
Grain, p. 79.

Embelia Ribes, *Burm.* N.O. Myrsineæ.
Fruits and seeds, p. 55.

Enicostema littorale, *Blume.* N.O. Gentianaceæ.
Plant, p 55.

Entada scandens, *Benth.* N.O. Leguminosæ.
Seeds, p. 55.

Eriodendron anfractuosum, *D.C.* N.O. Malvaceæ. Young fruits of the white cotton tree. p. 55.
Seeds, p. 32.
Cotton.
This plant is also a source of cotton.

Erythrina indica, *Lamk.* N.O. Leguminosæ.

Hind. Pangra, Panjira, Mandārā. *Tam.* Kalyana Murangai.
Tel. Barijamu, Bādise, Mahameda. *Kan.* Hāliwarā, Pāliwāra.

A moderate-sized tree, very common and ornamental plant in South India. The leaves are used as food in the form of curries and also as fodder for cattle. The juice of the leaves is used in conjunctivitis. (Watt's Dy.)

Erythroxylon monogynum, *Roxb.* Red Cedar. N.O. Lineæ.
Tam. Devadaru. *Tel.* Gaddara, Gathara, Gadini.
Kan. Devadarum.

A small tree common in the dry forests of the Deccan and the Carnatic. The wood yields an only substance which is a preservative for Indian boats. (Watt's Dy.)

Eucalyptus globulus, *Labil.* N.O. Rubiaceæ.
The Blue Gum, p. 120.

Eugenia Jambolana, *Lam.* N.O. Myrtaceæ.
Bark, p. 55.

Eulophia campestris, *Lindl.* N.O. Orchideæ.
Root, p. 55.

Evolvulus alsinoides, *Linn.* N.O. Convolvulaceæ.
Plant, p. 55.

Exacum bicolor, *Roxb.* N.O. Gentianaceæ.
Flowering tops and Stalks, p. 56.

Feronia elephantum, *Correa.* N.O. Rutaceæ.
Fruits, p. 56. Fruits also used as food.
Gum, p. 120.

Ficus asperrima, *Roxb.* N.O. Urticaceæ.
Bark, p. 56.

Ficus bengalensis, *Linn.* N.O. Urticaceæ.
Bark, p. 56.

Ficus elastica, *Bl.* N.O. Urticaceæ.
Gum, p. 121.

Ficus hispida, *L.f.* N.O. Urticaceæ.
Bark, p. 56.

Ficus retusa, *Linn.* N.O. Urticaceæ.
Root Bark, p. 56.

Garcinia Morella, *Desrouss.* N.O. Guttiferæ.
Gum resin, p. 121.

Gardenia gummifera, *Linn.* N O. Rubiaceæ.
Gum, p. 121.

Geniosporum prostratum, *Benth.* N.O. Labiatæ.
Plant, p. 57.

Gisekia pharnaceoides, *Linn.* N.O. Ficoideæ.
Plant, p. 57. It is also used as a pot herb.

Gloriosa superba, *Linn.* N.O. Liliaceæ.
Root, p. 57.

Glycine Soja, *Siel.* N.O. Leguminosæ.
Seeds, p. 89.

Gmelina asiatica, *Linn.* N.O. Verbenaceæ.
Root, p. 57.
Leaves, p. 57.

Gossypium, *Sp.* N.O. Malvaceæ. From Kistna and Coimbatore, p. 147.

Guizotia abyssynica, *Cass.* N.O. Compositæ.
Seeds, p. 57. Yield an edible and illuminating oil.

Hardwickia binata, *Roxb.* N.O. Leguminosæ.

Hind. Anjan.
Tam. Acha, Atti, Tamil.
Tel. Nar Yepi, Yapa, Yepi.
Kan. Kamra, Karachi.

A large deciduous, graceful tree, common in the forests of South India, chiefly in Salem, Coimbatore, Gōdāvari, Kistna, Anantapur and Bellary. The leaves are used as fodder for cattle (Watt's Dy.)

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Hæmotoxylon campechianum, *Linn.* N.O. Leguminosæ.

A small tree introduced from the West Indies and often cultivated in the gardens.

The wood is a very valuable dye wood and gives deep red, violet or black dye. (Gamble's Timbers.)

Helianthus annuus, *Linn.* N.O. Compositæ.

Hind. Surajmukhi. *Tam.* Suryakanthi.
Tel. Aditya Bhakti-chettu.

A common herbaceous plant, cultivated in the gardens. Native of Mexico and Peru.

Use. The seeds yield a valuable oil which is edible when pure; also used for candle and soap-making. The oil-cake forms an excellent food for cattle. (Watt's Dy.)

Helictres Isora, *Linn.* N.O. Sterculiaceæ.
Fruits, p. 58.

Heliotropium indicum. *Linn.* N.O. Borragineæ.
Leaves, p. 58.

Hemidesmus indicus, *R. Br.* N.O. Asclepiadeæ.
Roots, p. 58.

Herpestis Monniera, *H. B. & K.* N.O. Scrophularineæ.
Plant used in medicine.

Hibiscus esculentus, *Linn.* N.O. Malvaceæ.
Fruit, p. 58. Also used as food.

Holarrhena antidysenterica. *Wall.* N.O. Apocynaceæ.
Seeds, p. 58.

Hydnocarpus Wightiana. *Bl.* N.O. Flacourtiaceæ.
Seeds, p. 58.

Hydrocotyle asiatica, *Linn.* N.O. Umbelliferæ.
Plant, p. 59.

Hygrophila spinosa, *T. And.* N.O. Acanthaceæ.
Plant, p. 59.

Hyoscyamus niger, *Linn.* N.O. Solanaceæ.

Tam. Kūrā-sani Yomam. *Tel.* Kūrāshani-Vāmam.
Kan. Khurasāni-Vadaki. *Hind.* Khurāsāni Jamāni.

A herb of the temperate Western Himalayas and largely cultivated in many places in Northern India. The seeds yield an oil for which no use has yet been found. (Watt's Dy.)

Illicium vermu, *Hook. f.* N.O. Magnoliaceæ.

A native of China and is often called as the "Star arise" of China. It is cultivated in a few places in India. The fruits are used in medicine. (Watt's Dy.)

Illicium anisetum, *Linn.* N.O. Magnoliaceæ.

Tam. Anāshuppu. *Tel.* Anāsāpuvu.
Hind. Anāsaphal, Sonf.

This is the Japanese sacred anise tree. A native of South China. The seeds of this tree are used in medicine. (Watt's Dy.)

Indigofera aspalathoides, *Vahl.* N.O. Leguminosæ.
Shoot, p. 59.

Indigofera timctoria, *Linn.*
Leaves, p. 109. Yields the indigo of commerce. Stems are used in medicine. Seeds yield an oil which is of medicinal value. Indigo, p. 109.

Ionidium suffruticosum. *Ging.* N.O. Violaceæ.
Plant, p. 59.

Ipomæa biloba, *Forsk.* N.O. Convolvulaceæ.
Leaves, p. 59.

Ipomæa hederacea. *Jacq.* N.O. Convolvulaceæ.

Tam. Kōdi, Kākattān virai. *Tel.* Kollivittule.
Kan. Ganribija.

A common plant, cultivated for fruits all over India. The seeds are used as a drastic purgative. They form an excellent substitute for jalap. (Watt's Dy.)

Ipomæa turpethum, *Br.* N.O. Convolvulaceæ.
Root, p. 59.

Jatropha curcas, *Linn.* N.O. Euphorbiaceæ.
Seeds, p. 60.

Jatropha glandulifera. *Roxb.* N.O. Euphorbiaceæ.
Seeds, p. 60.

Lagenaria Vulgaris, *Seringe.* N.O. Cucurbitaceæ.
Seeds, p. 60.

Lawsonia alba, *Lam.* N.O. Lythraceæ.

Tam. Maruthani, Aiyavanam. *Tel.* Goranta, pachchapedda goranta.
Hind. Mehendi, Hēna. *Kan.* Gōrantlu, Gorante.

A small, sweet scented, elegant bush, cultivated all over South India, for its leaves and flowers. The seeds, bark, flowers, leaves all are used in Indian medicine. (Watt's Dy.)

Lens esculenta, *Moench.* E.O. Leguminosæ.
Seeds, p. 89.

Lepidium sativum, *Linn.* N.O. Cruciferæ.
Seeds, p. 60.

Leucas aspera, *Spreng.* N.O. Labiatæ.
Plant. p. 60. Flowers, p. 60. Also used for worshipping God Siva.

Linum usitatissimum. *Linn.* N.O, Linaceæ.
Seeds, p. 61.

Lippia nodiflora, *Rich.* N.O. Verbenaceæ.
Plant, p. 60.

Luffa acutangula, *Roxb.* Var Amara. N.O. Cucurbitaceæ.
Fruits, p. 61. Plant, p. 61. Seeds, p. 61.

Luffa ægyptiaca, *Mill.* N.O. Cucurbitaceæ.

Tel. Gutti bera, nūne bira, vetti bira. *Hind.* Ghia tarni, purula.

A common herbaceous plant over all the hot districts in the Presidency. An oil is expressed from the seeds which is used in medicine. The seeds are also used by native practitioners for their emetic and cathartic properties. (Watt's Dy.)

Mallotus philippinensis, *Muell.* N.O. Euphorbiaceæ
Epidermal gland of fruits, p. 61.

Manihot utilissima, *Pohl.* Tapioca. N.O. Euphorbiaceæ.

Tam. Maravuli.

A South American tall herbaceous plant, abundantly cultivated in South India. It has a tuberous root from which cassava bread and tapioca are manufactured. In Nellore and Trivandrum, the cultivation is on a large scale. (Watt's Dy.)

Melia azadirachta, *Linn.* N.O. Meliaceæ.
Bark, p. 61. Seeds, pp. 33, 61.

Millingtonia hortensis, *Linn.* N.O. Bignoniaceæ.

Tam. Katmalli. *Kan.* Beratu mara.
Hind. Mini chambeli, akas-nim.

A very common avenue and garden tree in this Presidency. From the bark an inferior kind of cork is made.

Mimusops elengi, *Linn.* N.O. Sapotaceæ.
Bark, p. 61. Seeds, pp. 33, 61.

Mimusops hexandra, *Roxb.* N.O. Sapotaceæ.
Bark, p. 62.

Moringa pterygosperma, *Gaertn.* N.O. Moringaceæ.
Root, p. 62. Bark, p. 62. Seeds, p. 33.

Mukia scabrella, *Arn.* N.O. Cucurbitaceæ.
Shoots, p. 62.

Musa sapientum, Musa paradisiaca, *Linn.* N.O. Scitamineæ.
Leaf sheath, p. 144.

Myristica fragrans, *Houtt.* N.O. Myristicaceæ.
Seeds, p. 62. aril, p. 95.

Nardostachys Jatamansi, *DC.* N.O. Valerianaceæ.
Spike hard. Roots, p. 63.

Nelumbium speciosum, *Willd.* N.O. Nymphæaceæ.
Seeds, p. 63. Seeds also strung as beads for rosaries.

Nerium odorum, *Soland.* N.O. Apocynaceæ.

Tam. Arali. *Tel.* Gannēru, gheneru.
Kan. Kanagale, levagani, gālu. *Mal.* Alari.
Hind. Kanēr, Kanēl, Karbēr.

A sweet scented evergreen shrub indigenous at the lower slopes of the western Himalayas and cultivated in gardens all over South India. It has beautiful, scented, red flowers. Root are used externally for skin diseases. (Watt's Dy.)

Nicotiana tabacum, *Linn.* N.O. Solanaceæ.

Tam. Pugai-ilai, poghai-elai. *Tel.* Pogāku.
Kan. Hogesappu. *Mal.* Pukaila.
Hind. Tamāku, tumāk, tambāka.

An erect, viscidly pubescent herb with large amplexicaul lanceolate acuminate leaves. Probably a native of Central or South America, very widely cultivated in South India, the chief places being Kistna and Gōdāvari deltas, Coimbatore, Madura, Trichinopoly, Chingleput, the Nilgiris, etc. Tobacco leaves are used in medicine. But the well-known use of tobacco is in the making of cigars. A large quantity of it is chewed as such by the Indians of the country. (Watt's Dy.)

Nyctanthes Arbor-tristis, *Linn.* N.O. Oleaceæ.
corolla tubes, p. 110.

Nymphæa lotus, *Linn.* N.O. Nymphеaceæ.
Roots, p. 63. Seeds, p. 63.

Ocimum Basilicum, *Linn.* N.O. Labiatæ.
Seeds, p. 63. Plant, p. 63.

Ocimum canum, *Sims.* N.O. Labiatæ.
Plant, p. 63.

Ocimum sanctum, *Linn.* N.O. Labiatæ.
Seeds, p. 64. Leaves, p. 64.

Odina Wodier, *Roxb.* N.O. Anacardiaceæ.
Gum, p. 122. Bark, pp. 64, 110. Bark is also used as a detergent.

Oldenlandia umbellata, *Linn.* N.O. Rubiaceæ.
Root, p. 111.

Oroxylum indicum, *Vent.* N.O. Bignoniaceæ.
Bark, p. 111.

Oryza sativa, *Linn.* N.O. Gramineæ.
Paddy and rice, pp. 83—87.

Panicum miliare, *Lamk.* N.O. Gramineæ.
Grains, used as food as other Panicum grains mentioned in cereals.

Papaver somniferum, *Linn.* N.O. Papaveraceæ.
Seeds, p. 64. Empty capsules, p. 64.

Pavetta indica, *Linn.* N.O. Rubiaceæ.
Roots, p. 64.

Pedalium Murex, *Linn.* N.O. Pedaliaceæ.
Fruits, p. 64.

Pennisetum typhoideum, *Rich.* N.O. Gramineæ, grains. p 81

Peucedanum graveolens, *Benth.* N.O. Umbelliferæ.
Fruits, p. 64.

Phaseolus Mungo, *Linn.* N.O. Leguminosæ. p. 96.

Phyllanthus Emblica, *Linn.* N.O. Euphorbiaceæ.
Bark, p. 111. Roots, p. 111.

Picrorrhiza Kurroa, *Benth.* N.O. Scrophulariaceæ.
Root, p. 65.

Pimpinella anisum, *Linn.* N.O. Umbelliferæ.
Fruits, p. 65.

Piper Betle, *Linn.* N.O. Piperaceæ. Leaves.

Tam. Vettilai. *Tel.* Tamalapāku.
Kan. Vile-dele. *Mal.* Vettila.
Hind. Pān, tāmbuli.

A perennial dicœcious creeper. Cultivated all over South India, practically in every district and village. The betel leaves of Trichinopoly, Coimbatore, Poonamallee (Madras), Gōdāvari and Nellore are considered to be very good. Almost every native of India chews the betel along with arecanuts and chunam. Supposed to have carminative, digestive and aphrodisiac properties.

Piper Cubeba, *L.f.* N.O. Piperaceæ.
Fruits, p. 65.

Piper longum, *Linn.* N.O. Piperaceæ.
Fruits, p. 65.

Piper nigrum, *Linn.* N.O. Piperaceæ.
Seeds, p. 65.

Pistacia integerrima, *Stewart.* N.O. Anacardiaceæ.
Pistachio galls, p. 65.

Pistia Stratiotes, *Linn.* N.O. Araceæ.
Plant, p. 66.

Pisum sativum, *Linn.* p. 91. N.O. Leguminosæ.

Pithecolobium dulce, *Benth.* N.O. Leguminosæ.
Seeds, p. 33.

Plumbago zeylanica, *Linn.* N.O. Plumbagineæ.
Roots, p. 66.

Poniciana elata, *Linn.* N.O. Leguminosæ.

Tam. Padenarayan. *Tel.* Chitikēswarum, Sunkeswar.
Kan. Nirangi, Sunkanthe mara.

An erect tree, found wild in the forests of South India and cultivated elsewhere. The bark is said to be used in medicine. (Watt's Dy.)

Pongamia glabra, *Vent.* N.O. Leguminosæ.
Pods, p. 34.

Prunus amygdales, *Baill.* N.O. Rosaceæ.

Tam. Vādam-Kottai. *Tel.* Badamvittulu.
Kan. Badami. *Mal.* Vatam Kotta.
Hind. Bādām.

A middle-sized tree which is supposed to be a native of Persia and Asia Minor. Cultivated in Kashmir, Afghanistan and Persia. The kernels or seed lobes of the almonds are largely used as a dessert and in confectionery. The burnt shells are made into tooth powder by the people of this Presidency. (Watt's Dy.)

Psidium guava, *Linn.* N.O. Myrtaceæ.
Roots are used in medicine. Bark, p. 111.

Psoralea corylifolia, *Linn.* N.O. Leguminosæ.
Seeds, p. 66.

Pterocarpus santalinus, *L.f.* N.O. Leguminosæ.
Wood, p. 66.

Punica granatum, *Linn.* N.O. Punicaceæ.
Rind of fruit, p. 66. Root, p. 66.

Quercus infectoria, *Oliver.* N.O. Fagaceæ.
Galls, p. 66. Galls are also used in dyeing.

Randia dumetorum, *Lamk.* N.O. Rubiaceæ
Bark, p. 67.

Ricinus communis, *Linn.* N.O. Euphorbiaceæ.
Seeds, p. 67. A variety grown at Zanzibar.

Rubia cordifolia, *Linn.* Indian Madder. N.O. Rubiaceæ.
Root, p. 112.

Ruta graveolens, *Linn.* Var. angustifolia.
Leaves, etc., p. 67.

Salep. The name given to the dried tubers of numerous species of the genus Eulophia. N.O. Orchideæ.

Tam. Shālā mishiri. *Tel.* Sālā misiri.
Mal. Sālā mishri. *Hind.* Salab misri

The Salep of the Indian bazaars is principally derived from the tubers of Eulophia Campestris and Eulophia herbacea. The tubers are dug up after the plant has flowered and the plump firm ones are retained, the rest being thrown away. The tubers are supposed to be very nourishing and also to possess aphrodisiac properties and are largely used by the Indian practitioners in preparing nervine tonics. But the scientific opinion of it is very low. (Watt's Dy.)

Saltpetre, p. 164.

Salvadora persica, *Linn.* N.O. Salvadoraceæ.

Tam. Opa, ugā, ughai. *Tel.* Waraguwenki, ghunia pinna-vara-goggu.

Hind. Pilū.

A small evergreen tree found in the drier parts of India. The seeds yield an oil which is used medicinally by native practitioners. A stimulant. (Watt's Dy.)

Sansevieria zeylanica, *Willd.* N.O. Liliaceæ.
Fibre, p. 144.

Santalum album, *Linn.* N.O. Santalaceæ.
Seeds, p. 91 (Catalogue on timbers). The seeds yield an oil which is thick and viscid. It is burnt by the poorer classes in lamps.

Sapindus trifoliatus, *Linn.* N.O. Sapindaceæ.
Fruits, p. 67. Seeds, p. 67.

Saussurea Lappa, *C. B. Clarke.* N.O. Compositæ.
Roots, p. 67.

Schleichera trijuga, *Willd.* N.O. Sapindaceæ. p. 127.

Scindaspus officinalis, *Schott.* N.O. Araceæ.
Fruits, p. 67.

Sesamum indicum, *Linn.* N.O. Pedaliaceæ.
Seeds, pp. 34, 68. Oil-cake, p. 68.

Sesbania grandiflora, *Pers.* N.O. Leguminosæ.
Leaves, p. 68. Leaves also used as food.

Shorea Talura, *Roxb.* N.O. Dipterocarpaceæ.
Resin, pp. 68, 123.

Sida carpinifolia, *Linn.* N.O. Malvaceæ.

Tam. Vattatirippi, Chitimutti. *Mal.* Malatanni.
Hind. Bariāra, Kareta.

A perennial undershrub common all over South India, especially in the hot districts. The roots are said to possess diaphoretic, antipyretic, stomachic and tonic properties. (Watt's Dy.)

Sida spinosa, *Linn.* N.O. Malvaceæ.
Roots, p. 68. Leaves, p. 68.

Smilax china, *Linn.* N.O. Liliaceæ.
Roots, p. 69.

Solanum indicum, *Linn.* N.O. Solanaceæ.
Root, p. 69. Fruits, p. 69.

Solanum trilobatum, *Linn.* N.O. Solanaceæ.
Roots, p. 69.

Solanum xanthocarpum, *Schrad & Wend.*
Stem, p. 69. Root, p. 69. Fruits, p. 69.

Sonneratia apetala, *Ham.* N.O. Lythraceæ.
A moderate-sized tree, found in the tidal creeks of Bengal, in the Deccan peninsula, and in Burma. The sub-acid green fruit is used in Burma in curries. (Watt's Dy.)

Soymida febrifuga, *Juss.* N.O. Meliaceæ.
Bark, p. 113.

Sphaeranthus indicus, *Linn.* N.O. Compositæ.

Tam. Kottak, Kasandai. *Tel.* Boda tarapu.
Mal. Miran gani. *Hind.* Mundi, Gorak mundi.

A low annual of the Himalayas. The flowers are esteemed in the Punjab as alteratives, depuratives and tonics. The seeds and the root are considered anthelmintic. The bark is a cure for piles. (Watt's Dy.)

Steatite, p. 166.

Sterculia fœtida, *Linn.* N.O. Sterculiaceæ.

Tam. Pinari marum. *Tel.* Gurapu badam.
Kan. Bhatala penari. *Hind.* Jangli-badam.

A very common evergreen tree in South India with red fruits. The kernels of the seeds are roasted and eaten as food in times of scarcity. (Watt's Dy.)

Sterculia colourata, *Roxb.* N.O. Sterculiaceæ.

Tel. Karaka, Karu boppayi. *Hind.* Bodula, Walena, Samarri.

A large tree of Eastern Bengal and the Western Peninsula and Ceylon. The bark yields an inferior fibre. (Watt's Dy.)

Sterculia villosa, *Roxb.* N.O. Sterculiaceæ.
Fibre, p. 146.

Stereospermum xylocarpum, *Wight.* N.O. Bignoniaceæ.
Resin, p. 123. The fruit is said to be used in Indian medicine. The young ones are eaten as vegetable. (Watt's Dy.)

Strychnos nux-vomica, *Linn.* N.O. Loganiaceæ.
The fruits are eaten by several of the Konkans. Seeds, pp. 34, 69. (Watt's Dy.)

Strychnos potatorum, *Linn.* N.O. Loganiaceæ.
Seeds, pp. 34, 69.

Sulphur.

Tam. Gandakani. *Tel.* Ghandakamu.
Mal. and *Kan.* Blerong. *Hind.* Gundhak.

There is not much of sulphur found in the Madras Presidency. It is mentioned that a deposit of sulphur was found between the two mouths of the river Gōdāvari. But sulphur in workable quantities is found in mines in Kashmir and Punjab and Baluchistan and Afghanistan. Sulphur is largely used both in Hindu and English medicine. A great deal is used in the manufacture of gunpowder. Smaller quantities are used to make sulphuric acid (Watt's Dy.)

Swietenia Mahogany, *Linn.* N.O. Meliaceæ.
Gum from Kallar, Nilgiris, p. 123.

Tamarindus indica, *Linn.* N.O. Leguminosæ.

Leaves, p. 70. The leaves are also used as a vegetable and as a dyestuff. An infusion of the leaves is said to yield a red dye and to impart a yellow shade to cloth previously dyed with indigo (Atkinson). (Watt's Dy.) Seeds, p. 70. Seeds are also used as food. Tamarind, p. 95.

Tamarix articulata, *Vahl.* N.O. Tamariscineæ.

Tam. Shivappu-átru-shavukku. *Tel.* Erra-ērusaru.
Hind. Lāl-jhāv.

A moderate-sized tree, common in Sind and the Punjab. Grows well on sandy and saline soils. Easy of cultivation and requires little water after it has taken root. The galls produced on the branches by the puncture of an insect are used as a mordant in dyeing and also in tanning. (Watt's Dy.)

Tamarix gallica, *Linn.* N.O. Tamariscineæ.
Galls, p. 114.

Tectona grandis, *Linn.* N.O. Verbenaceæ.
Gums, p. 123.

Terminalia Arjuna, *Bedd.* N.O. Combretaceæ.

Tam. Vellai maruda, Vella marda, Vella matti.
Tel. Tandra (Cuddapah), tellamaddi, erra maddi.
Kan. Maddi, tormatti. *Mal.* Vella-maruta, Pulla-maruta.
Hind. Arjan, Kahú, árjúna.

A large deciduous tree, very common in the Madras Presidency. The fruit is prescribed as a tonic and deobstruent. (Watt's Dy.) There is a tree in the museum compound.

Terminalia belerica, *Roxb.* N.O. Combretaceæ. p. 70.

Tam. Tani Kai, Kattuclupa. *Tel.* Tani, tandi, toandi.
Kan. Tani Kayi, Yehla, tari. *Mal.* Thani, tani.
Hind. Bhairá, Baherā, Sagonā.

A very common large deciduous tree in this Presidency. There is one in the museum compound. The fruit is one of those exported from India under the name of Myrobolans. Largely used in India for dyeing and tanning. It produces a yellowish or brownish yellow colour to the cloth. Also used in medicine. (Watt's Dy.)

Terminalia Chebula, *Retz.* N.O. Combretaceæ. p. 70.

Fruit,—One of the most valuable of Indian dyeing and tanning materials. The dried fruit forms the "chebulic" or "black" myrobolan of commerce. The rind of the fruit is powdered and steeped in water and used as a dye. The cloth steeped in the infusion acquires a dirty grey colour. It is also used in combination with other dyes. See the exhibits in the Dyes and Tans' Show cases. Galls, the galls are used with the fruit and alum in dying and a good permanent yellow colour is obtained. (Watt's Dy.)

Terminalia tomentosa, *Bedd.* N.O. Combretaceæ.
Fruit, p. 114. Bark, p. 114.

Theobroma cacao, *Linn.* N.O. Sterculiaceæ.

A small tree wild in America and cultivated abundantly on the hills in South India. Grown along with coffee and tea. Ceylon has a great many acres under cocoa cultivation. The "cocoa butter" which is a light yellowish, opaque solid oil used largely in pharmacy is obtained by pressing the warmed seeds. The fruit (see picture attached to the show case) is about 6" to 10" long and 3" to 5" in girth and contains 50 or more seeds. These seeds dried and ground form the cocoa nibs of commerce, from which cocoa extracts and chocolate are prepared. (Watt's Dy.)

Thespesia populnea, *Corr.* N.O. Malvaceæ. p. 114.

The seeds are said to be used in Patna in hors e medicines and in purges. (Watt's Dy.)

Thevitia neriifolia, *Juss.* N.O. Apocynaceæ.

Tam. Pachchaialari. *Tel.* Pachcha-ganneru.
Mal. Pachchalari. *Hind.* Zaid Kunēl, pila kanēl.

An introduced American plant. It is bushy in habit and is very common all over India, especially in every private garden. An oil is obtained from the seeds which burns well without giving off much smoke. It is also of medicinal value. (Watt's Dy.)

Tinospora cordifolia, *Miers.* N.O. Menispermaceæ.
Stem, p. 70.

Toddalia aculeata, *Pers.* N.O. Rutaceæ.
Roots, p. 70.

Tragia involucrata, *Linn.* N.O. Euphorbiaceæ.

Tam. Kân chūri-vayr.
Tel. China dula gondi, rēvati-dula gondi.
Hind. Barpantā.

There are four varieties of this plant. It is a common stinging weed in the dry places in South India. The roots are valuable as medicine. The root is used in skin diseases and venereal complaints. (Watt's Dy.)

Trapa bispinosa, *Roxb.* N.O. Onagraceæ.

Tam. Singhara Kai. *Tel.* Kubyākām.
Mal. Karim-polam. *Hind.* Singhárá.

A floating herb, found on lakes, tanks and pools throughout South India. The kernels of the fruit are eaten either raw or cooked by the natives in South India. The nuts are supposed to be good for bilious affections. (Watt's Dy.)

Trianthema decandra, *Linn.* N.O. Ficoideæ.
Root, p. 71.

Tribulus terrestris, *Linn.* N.O. Geraniaceæ.
Fruits, p. 71.

Trichodesma indicum, *Br.* N.O. Boragineæ.

Tam. Kazuthai tumbai. *Tel.* Guvva gutti.
Hind. Chhota-Kulpha.

A coarse hispid herb, common in plains in South India. The leaves are considered by the people of Punjab to be cooling. In South India the leaves are believed to cure snake bites. (Watt's Dy.)

Trichosanthes palmata, *Roxb.* N.O. Cucurbitaceæ.
Fruit, p. 71.

Trigonella Fœnumgræcum, *Linn.* N.O. Leguminosæ.
Seeds, pp. 71, 96.

Triticum vulgare, *Vill.* N.O. Gramineæ.
p. 82.

Tylophora asthmatica, *W. & A.* N.O. Asclepiadaceæ.
Roots, p. 71. Leaves, p. 71.

Urginea indica, *Kunth.* N.O. Liliaceæ.
Bulbs, p. 74.

Vateria indica, *Linn.* N.O. Dipterocarpaceæ.
Gum resin, p. 124. Fruit, p. 35.

Ventilago madraspatana, *Gærtn.* N.O. Rhamneæ.
Root bark, p. 72.

Vernonia anthelmintica, *Willd.* N.O. Compositæ.
Seeds, p. 72.

Vigna Catiang, *Endl.* N.O. Leguminosæ.
Seeds, p. 91.

Vitex Negundo, *Linn.* N.O. Verbenaceæ.
Leaves, p. 72.

Vitis quadrangularis, *Wall.* N.O. Vitaceæ.
Shoots, p. 72. Shoots are also used for food.

Wedelia calendulacea, *Less.* N.O. Compositæ.

Tam. Postaley-Kaiantageraí. *Hind.* Bhánra, bhángrá.

A herbaceous plant, common in Bengal, Assam, Ceylon, etc., in wet places. The plant has a slight camphoraceous odour. The leaves of this plant are said to be used in dyeing grey hair and for promoting its growth. (Watt's Dy.)

Wrightia tinctoria, *R. Br.* N.O. Apocynaceæ.

Tam. Pálá, veypalé. *Tel.* Tedlu pal, tella pal.
Kan. Beppallí, hale. *Mal.* Kotakappala.
Hind. Indarjou, mithá indarjou.

A small deciduous tree, very common in South India. The seeds are used in the other materials in dyeing. They are not of any medicinal value. Pods are said to be eaten in Bombay. From the leaves a kind of a blue dye or indigo is obtained. (Watt's Dy.)

Zea Mays, *Linn.* N.O. Gramineæ.
Grain, p. 82.

Zingiber officinale, *Roscæ.* N.O. Scitamineæ.
Rhizome, pp. 72 & 74.

Zizyphus Jujuba, *Lamk.* N.O. Rhamneæ.

Tam. Elanda. *Tel.* Ganga hegu, hegí.
Kan. Yalachí, yelchí, ilanji. *Mal.* Elentha, elanta.
Hind. Bér, baer, beri.

A small tree, wild and extensively cultivated throughout India. In the *Bombay Gazetteer*, Vol. XV, it is mentioned that the bark yields a kind of Kino gum employed in tanning and for medicinal purposes. The bark is also used for tanning purposes. The fruit is eaten as food and employed also in medicine.

Zizyphus nummularia, *W. & A.* N.O. Rhamneæ.

Hind. Jar-berí.

A prickly shrub, found in the Punjab up to 3,000 ft., in the North-West Provinces and in the Western Peninsula. In North India the fruit is considered cool, astringent and of value in bilious affections and is therefore largely eaten. The bark is used for tanning. (Watt's Dy.)

VEGETABLE PRODUCTS.

OIL-SEEDS AND OILS.

1. **Abrus precatorius**, *Linn.* Indian Liquorice. N.O. Leguminosæ

Tam. Kundumani ennai. *Tel.* Ghuriginja noone.

A twining plant, common all over India. The oil is used in medicine. *Vide* Drugs.

2. **Acorus calamus**, *Linn.* The Sweet Flag. N.O. Aroideæ.

Tam. Vasambu ennai. *Tel.* Vasa noone.
Kan. Baje enne. *Mal.* Vazhampu enna.

A perennial semi-aquatic plant with a root stock, found in marshy places in Malabar. Used in medicine. *Vide* Drugs.

3. **Aleurites molucanna**, *Willd.* The Belgaum or Indian Walnut or the candle nut. N.O. Euphorbiaceæ.

Tam. Nattuakrotu ennai. *Tel.* Nattuakrotu noone.
Kan. Nattuakrotu enne.

A large handsome tree, distributed over South India and common in Madras. The oil is used in medicine as a purgative, as good as castor oil in its effects. Also used as an illuminating oil. (Watt's Dy.).

4. **Allium cepa**, *Linn.* The Onion. N.O. Liliaceæ.

Tam. Vengaya virai ennai. *Tel.* Vooligadda vittulu noone.
Kan. Irulli bija enne.

A bulbaceous plant, cultivated everywhere in South India. The oil is used in Indian medicine as an expectorant, etc. (Watt's Dy.)

5. **Anacardium occidentale**, *Linn.* The Cashew Nut. N.O. Anacardiaceæ.

Tam. Munthirikottai ennai. *Tel.* Munthamamidi banka noone.

A tree common in the hot districts of South India, especially near the coast, Tanjore, Malabar, South Arcot, etc. The oil is very tasteful and edible, but very costly. "The pericarp of the seed which is partly outside the fruit contains an acrid oil, black in colour, which is a good preventive against whiteants and which is used for tanning or colouring boats and fishing lines and fishing nets." (Muk.)

6. **Anamirta cocculus**, *W. & A.* N.O. Menispermaceæ.

Tam. Kakkaikolli virai ennai. *Tel.* Kakkamari vittulu noone.
Kan. Kakkumari bija enne.

A twining plant distributed over Malabar, Konkan and Circar mountains. The oil is fatty and therefore good for candle-making (Watt's Dy.) Also employed in Ayurvedic medicine. (Drury.)

7. Andropogon Schænanthus, *Linn.* Rusa Oil Grass. N.O. Gramineæ.

This grass is wild in Central India, North-West Provinces and the Punjab. It resembles in quality and appearance the lemon grass oil. Used in perfumery chiefly as an adulterant for attar of roses. Also employed in native medicine as a liniment in chronic rheumatism and neuralgia. (Watt's Dy.)

8. Andropogon citratus, *D.C.* The Lemon Grass. N.O. Gramineæ.

Tam. Vashanappullu, Kurpura pullu ennai.

Tel. Nimmagaddi, Chippa gaddi noone.

Mal. Vasanappulla, Shambhara pulla enna.

Kan. Pur-halihulla enne.

A large coarse grass, common in gardens all over India. The oil is used to adulterate Verbena oil. Largely employed to perfume soaps, and greases. Used in most of the native perfumery. (Watt's Dy.)

9. Arachis hypogæa, *Linn.* The groundnut. N.O. Leguminosæ.

Tam. Mallakottai or Verkadalai ennai. *Tel.* Vershanige noone.

Kan. Nelakadale enne.

An annual and a native of America. Extensively cultivated in South India and chiefly in the districts of South Arcot, North Arcot, Tanjore and Nellore. Chiefly cultivated in the light soils of the Presidency and requires no irrigation. Can be sown at any time except in the rainy months. Enriches the land in which it grows by its root nodules which are full of nitrogenous matter.

The demand for the oil is very great in Europe especially in France. The cleaned seeds yield about 43 per cent of this straw coloured oil.

The oil burns slowly but it does not give a bright light. It is as good as olive oil and is largely used even for medicinal purposes as a substitute for olive oil. It does not get rancid so quickly as other oils do. Largely employed for adulterating ghi, coconut and gingelly oils. In Europe it is employed to a very great extent in soap making, dressing cloth and in lubricating machinery. The export is done only in the form of nuts and not oil. The oil cake is a nutritious food for cattle and it has been recommended as a highly rich human food in a cooked form. (Muk.)

10. Argemone mexicana, *Linn.* The Prickly Poppy. N.O. Papaveraceæ.

Tam. Brammadandu virai ennai. *Tel.* Brammadandu vittulu noone.

Kan. Dattooribija enna.

An introduced spiny herbaceous annual, common in all waste places, road sides, etc., with large yellow flowers and prickly fruits.

Appears in the cold seasons. The oil is suited for lamps and is also employed in the process of dyeing red thread. Also a very valuable medicine. *See* Drugs. (Hawkes.)

1. **Bassia latifolia**, *Roxb.* The Butter or Mahua Tree. N.O. Sapotaceæ.

Tam. Illuppa ennai. *Tel.* Ippi noone.
Kan. Ippe enne. *Mal.* Poonam enna.

A large deciduous tree indigenous in the forests of the Central Provinces. It is sparingly distributed in South India. The Mahua oil is extracted from the kernel of the fruit. The kernels are taken out of the fruit rubbed and subjected to pressure. The oil is largely used for lighting and as a substitute for ghi. It is of equal value with coconut oil for soap making. The oil-cake is used as a detergent. (Muk.)

2. **Bassia longifolia**, *Willd.* N.O. Sapotaceæ. Mahua tree of South India.

Tam. Illuppa ennai. *Tel.* Ippi noone.
Kan. Hippe enne.

A large evergeen tree, common in Western and Southern India from the Konkan southwards. The oil is seldom to be met with in the bazaar, yet large quantities of the seeds are gathered and the oil extracted for private consumption. Excellent candles and soap may be made from it and as a substitute for butter and for burning in lamps it is employed by the poorer class. (Hawkes.)

3. **Brassica alba**, *H.F. & T.T.* N.O. Cruciferæ.

Tam. Vellai Kadugu ennai. *Tel.* Thella Avala noone.
Kan. Bili Sasave enne.

A small herbaceous plant, mostly cultivated for its seeds in Europe. It is to be found in Upper India and very rare in South India. The oil is used in medicine. *See* Drugs.

4. **Brassica juncea**, *H.F. & T.T.* N.O. Cruciferæ.

Tam. Kadugu ennai. *Tel.* Avalu noone.
Kan. Sasave enne.

A herbaceous plant, largely cultivated for its seeds and oil. More common in Upper India. In South India, it is grown chiefly in Salem and Coimbatore uplands and in Ganjām and on the lankas of Kistna. The oil is largely esteemed as an article of food. But it is only inferior to Rape oil. Often adulterated with poppy seed and other oils. (Watt's Dy.)

5. **Buchanania latifolia**, *Roxb.* N.O. Anacardiaceæ.

Tam. Kattu Mangkottai or Sarapparupu ennai.
Tel. Chara pappu noone. *Kan.* Nuskel enne.

A middle-sized tree met with in the dry forests throughout India—Cuddapah and Kurnool districts. The kernels of the seeds yield a sweet and wholesome oil (Chironji) but owing to their being much prized as a sweetmeat when cooked, the oil is seldom expressed. Also used in medicine. (Hawkes.)

16. Cæsalpinia Bonducella, *Fleming.* The Physic nut. N.O. Leguminosæ.

Tam. Gajjkai ennai. *Tel.* Gejjakaya noone.
Kan. Gajkai bija enne.

A large prickly climbing shrub, common in hedges near villages. Very common in the Coromandel and Malabar Coasts. The oil is employed as a cosmetic and also used in medicine. (Watt's Dy.)

17. Calophyllum Wightianum, *Wall.* N.O. Guttiferæ.

Tam. Siru pinnai ennai. *Mal.* Tsira panna enna.

A small evergreen tree, common along the Western Ghats from the Konkan to Travancore. The oil is greenish in colour. Has a disagreeable odour and flavour, but is largely used for burning. (Watt's Dy.)

18. Cannabis sativa, *Linn.* Hemp Seed. N.O. Urticaceæ.

Tam. Ganja ennai. *Tel.* Ganja noone.
Kan. Bhangi enna.

A tall erect annual herb. Wild in the N.W. Himalayas and cultivated elsewhere in India. In South India, the Government cultivate it at Padavedu, North Arcot. Used as a lamp-oil in Russia. Less commonly used so in India. (Hawkes.)

19. Carthamus tinctorius, *Linn.* Safflower-oil. N.O. Compositæ.

Tam. Kusamba ennai. *Tel.* Agni chettu noone.

An annual herbaceous plant with large orange coloured flower heads cultivated all over India. Grows abundantly in black cotton soil in Tinnevelly and Mysore. The oil is clear yellow in colour and edible. In Europe it is used for the manufacture of fancy soaps, etc. (Hawkes.) Extensively used for culinary purposes and to adulterate ghi. The oil is also converted into a substance known as Roghan that is used for greasing well ropes, leather buckets, harness, etc. (Watt's Dy.)

20. Celastrus paniculata, *Willd.* N.O. Celastrineæ.

Tam. Valulvai virai ennai. *Tel.* Malkangunni vittulu noone.
Sansk. Jyotishmati. *Mal.* Valuzhuva vittu enna.

A scandent shrub of the outer Himalayas from the Jhelum to Assam ascending to 4,000 feet. Also found throughout the hilly districts of India, Burma and Ceylon. Common in the Northern Circars especially in Vizagapatam and Ellore. The oil extracted from the seeds is deep scarlet or yellow in colour. Used in medicine for external application. Also burnt in lamps and employed in certain religious ceremonies. Above all things its usefulness lies in the fact that it is used in the production of the oleum nigrum of pharmacy. This oil is mixed with benzoine, cloves, nutmegs and mace and distilled. The resulting product is oleum nigrum which is useful in the treatment of beri-beri. Chiefly manufactured in Vizagapatam and Ellore. (Watt's Dy.)

21. Cerbera odollam, *Gærtn.* N.O. Apocynaceæ.

Tam. Kat arali. *Mal.* Othalam.

A moderate-sized evergreen tree, common in the coast forests of India. The oil is used for burning lamps. (Watt's Dy.)

22. **Citrullus vulgaris**, *Schrad.* N.O. Cucurbitaceæ. The water melon.

Tam. Pichcha virai ennai. *Tel.* Karumboja vittulu noone.

Kan. Kargunje enne.

A climbing or trailing hispid, annual, cultivated all over India. The oil extracted from the seeds is used in cooking and in burning lamps. (Watt's Dy.)

23. **Cocos nucifera**, *Linn.* N.O. Palmeæ. The coconut palm.

Tam. Tenga ennai. *Tel.* Tenkai noone.

Kan. Tengina enne.

Found all along the coast in South India. A familiar tall palm with a crown of leaves at the top. Extensively cultivated in the districts of Malabar and Kanara, Ganjām and Rajahmundry. There are two methods of preparation of the oil, namely, the hot wet process and the cold dry process. In the hot wet process the copra is boiled with water, grated and squeezed, the resulting emulsion being again boiled till the oil rises to the surface. Gives a colourless pure oil. In the cold dry process, the copra is crushed in native oil mills worked by oxen. Gives the crude oil. (Dr. Watt's Comm. Prods.) The best oil is obtained from Cochin, and the neighbouring towns on the Malabar Coast. The oil is used in many ways. Largely used in cooking all over South India. Used in toilet purposes. Also employed for burning lamps. Very largely used in England in the manufacture of candles and soap. Attempts are being made now in Calicut to develop these industries here. The oil is usually made into soap by boiling with a proper proportion of dhobies' earth, salt, saltpetre, quicklime and water. (Hawkes.)

The oil cake or poonac is an excellent food for working bulls and pigs.

24. **Croton tiglium**, *Linn.* N.O. Euphorbiaceæ. The purging croton.

Tam. Nervala virai ennai. *Tel.* Nepala vittu noone.

Kan. Nepala bija enne.

A small evergreen tree, common in South India and Ceylon. The oil is used in medicine as a drastic purgative. Also used in Veterinary medicine. (Hawkes.)

25. **Cucumis sativus**, *Linn.* N.O. Cucurbitaceæ. The cucumber.

Tam. Muhaveri virai ennai. *Tel.* Dosa vittulu noone.

Kan. Santi kayee enne.

A climbing hispid, annual, cultivated all over India. The oil is made in Masulipatam and Guntūr. Used in medicine and in cooking.

26. **Cucurbita maxima**, *Duchesne.* N.O. Cucurbitaceæ. Melon pumpkin.

Tam. Pushini virai ennai. *Tel.* Gummadi vittulu noone.

Kan. Kumble bija enne.

A large climbing hispid, annual. The oil is used in medicine as a nervine tonic. *Vide* Drugs.

27. Cuminium cyminum, *Linn.* N.O. Umbelliferæ.

Tam. Siragam ennai. *Tel.* Jilakara noone.
Kan. Jirege enne.

A slender annual herb. Extensively cultivated in Rajputana and other parts of North India. The oil is considered to have astringent and cooling properties and therefore it is used in medicine. Also used in culinary preparations. (Hawkes.)

28. Cynometra ramiflora, *Linn.* N.O. Leguminosæ.

Tam. Irapu ennai.

A large evergreen tree, common on the sea coast tidal forests of South India. The oil is used in medicine for leprosy and other cutaneous diseases. (Watt's Dy.)

29. Eriodendron anafractuosum, *D.C.* N.O. Malvaceæ. The white silk cotton tree.

Tam. Ilavam ennai. *Tel.* Buruga or Kadami noone.
Kan. Dudi mara enne.

A middle-sized deciduous tree, common in forests throughout the hotter parts of India and also cultivated. The seeds yield 28 per cent of an oil which much resembles cotton seed oil. The cake is found to be a highly beneficial cattle food. The oil is used in Holland as food and in the manufacture of soap.

30. Erythroxylon monogynum, *Roxb.* N.O. Lineæ. The Bastard Sandal or Red Cedar.

Tam. Sempulichcham or Devadaroo ennai.

A shrub found in the dry forests of the Deccan and Carnatic. The oil is used as a preservative for timber and native boats. It resembles tar. Extracted by packing pieces of the wood in an earthen pot inverted over a similar pot surrounded by fire. (Watt's Dy.)

31. Hydnocarpus Wightiana, *Bl.* N.O. Flacourtiaceæ.

Tam. Neerali muttu ennai. *Tel.* Niradi vittulu noone.

A common tree in Malabar along the Coast. The oil is used in medicine. (Watt's Dy.)

32. Jatropha curcas, *Linn.* N.O. Euphorbiaceæ.

Tam. Kattamanakku ennai. *Tel.* Adaviamida noone.
Kan. Maraharaloo enne. *Mal.* Kattamanakku enna.

Very common near villages; cultivated and naturalized throughout India. An evergreen shrub. The oil extracted from the seeds is used as a purgative. (Watt's Dy.)

33. Jatropha glandulifera, *Roxb.* N.O. Euphorbiaceæ.

Tam. Addalai ennai. *Tel.* Nela amida noone.

An evergreen shrub, very common in dry places and near villages in the Deccan peninsula. The oil is used as an external application for rheumatism and paralysis; it possesses also purgative properties. (Watt's Dy.)

34. Linum usitatissimum, *Linn.* The flax or linseed plant. N.O. Lineæ.

Tam. Alshi virai ennai. *Tel.* Madan gingalu noone.
Kan. Alashi enne.

An annual herb, cultivated throughout India. In South India linseed cultivation is common in Bellary and Guntūr districts. The oil is used in painting. Linseed cake is a very valuable cattle food and manure. (Hawkes.)

35. Melia Azadirachta, *Linn.* The nim or margossa tree. N.O. Meliaceæ.

Tam. Veppennai. *Tel.* Vepa noone.
Kan. Bevi enne.

A common tree, throughout India. Often planted on the roadsides as a shade tree. From the seeds a fixed acrid bitter oil is extracted. This is of a deep yellow colour. A stimulant, insecticide and antiseptic. The poorer classes use the oil for burning. Employed in many complaints by Indian physicians. (Watt's Dy.)

36. Mimusops elengi, *Linn.* N.O. Sapotaceæ.

Tam. Mogadam ennai. *Tel.* Pogada noone.
Kan. Pogade enne.

A small tree, common in South India, and often cultivated in gardens. The oil is used in Indian medicine. (Hawkes.)

37. Moringa pterygosperma, *Gærtn.* N.O. Moringaceæ.

Tam. Murunga ennai. *Tel.* Muruga noone.
Kan. Nugge enne.

A small tree, cultivated all over South India. The oil is obtained from the seeds. Clear, limpid and almost colourless. The oil is highly valued as a lubricant by watch makers. Largely employed by perfumers in the preparation of perfumes. (Hawkes.)

38. Nigella sativa, *Linn.* Black cummin. N.O. Ranunculaceæ.

Tam. Karum shiragam ennai. *Tel.* Nalla Jilakara noone
Kan. Kari jirige enne.

A native of South Europe and extensively cultivated in many parts o India. The seeds yield by expression a dark coloured fragrant oil which is used in Indian medicine. (Hawkes.)

39, Papaver somniferum, *Linn.* The opium poppy. N.O. Papaveraceæ.

Tam. Gasagasa ennai. *Tel.* Gasagasalu noone.
Kan. Gasagasa enne.

An annual herbacious plant cultivated throughout India. The oil is used as food and also for burning lamps. Also peculiarly suitable for mixing with paints. The oil produces sleep and strengthens the brain. (Hawkes.)

40. Pithecolobium dulce, *Benth.* Manilla Tamarind. N.O. Legu minosæ.

Tam. Korakapulli ennai. *Tel.* Sima Chinduga noone.

A large tree and a native of Mexico. Extensively cultivated in Madras Presidency for fencing purposes. The oil is obtained from the seeds and it is used in Indian medicine.

41. Pongamia glabra, *Vent.* N.O. Leguminosæ.

Tam. Poongam ennai. *Tel.* Kanaga noone.
Kan. Honge enne. *Mal.* Pongam enna.

A tall erect tree or climber common all over India. The oil is obtained from the seeds. Red-brown in colour. Used in medicine and in burning lamps. (Drury.)

42. Psoralea corylifolia, *Linn.* N.O. Leguminosæ.

Tam. Karbogarasi ennai. *Tel.* Karbogi vittulu noone.

An erect annual under-shrub of 1—3 feet.

43. Raphanus sativus, *Linn.* The radish. N.O. Cruciferæ.

Tam. Mullangi ennai. *Tel.* Mullangi noone.
Kan. Mullange enne.

A biennial and a herbaceous plant. Extensively cultivated all over South India. The oil is used in Indian medicine.

44. Ricinus communis, *Linn.* The castor oil plant. N.O. Euphorbiaceæ.

Tam. Velakkennai or Amanakkennai. *Tel.* Amidam.
Kan. Avalenne.

A small shrub common all over tropical India. Extensively cultivated for its seeds. For its medicinal value see under Drugs. Also used for burning lamps.

45. Semecarpus anacardium, *Linn.* The marking nut. N.O. Anacardiaceæ.

Tam. Sherangkottai ennai. *Tel.* Jeedi vittulu noone.
Kan. Geru bija enne.

A common handsome tree in all parts of Tropical India. An oil is obtained from the nut by boiling and this is used externally in rheumatism, sprains, etc. (Watt's Dy.)

46. Sesamum indicum, *Linn.* The Gingelly oil. N.O. Pedalineæ.

Tam. Nallennai. *Tel.* Manchi noone.
Kan. Olle enne. *Mal.* Nallenna.

An extensively cultivated annual crop, common all over South India. The oil is extracted by pressure in ordinary country oil-mills. Recently an oil-mill worked by European machinery has been established in Triplicane, Madras, and it is found that the oil obtained in this way is much more pure and clear. The oil is used as food by almost all the people of South India. In addition to its being used as food, a large quantity is used for anointing the body. The oil leaves behind an excellent cake which is used as food both for cattle and human beings. The oil is also used for medicinal purposes.

47. Strychnos nux-vomica, *Linn.* The Strychnine tree. N.O. Loganiaceæ.

Tam. Ettikottai ennai. *Tel.* Indupu vittu noone.
Kan. Kharca bija enne.

Common throughout tropical India and especially in the Madras Presidency. It is a large deciduous tree. The oil is used in medicine by Indian doctors. (Watt's Dy.)

48. Strychnos potatorum, *Linn.* The clearing nut tree. N.O. Loganiaceæ.

Tam. Tetan Kottai ennai. *Tel.* Induga vittu noone.

A tree common in Deccan. The oil is used in medicine.

49. Terminalia belerica, *Roxb.* N.O. Combretaceæ.

Tam. Tanikkai ennai. *Tel.* Thandri noone.

A large deciduous tree, common throughout the forests of India below 3,000 ft. The seeds yield a fatty oil to the extent of 30·4 per cent. Used as a medicinal dressing for the hair. (Watt's Dy.)

50. Thespesia populnea, *Corr.* N.O. Malvaceæ.

Tam. Poovarasam ennai. *Tel.* Gangaraja noone.

Kan. Hoovarasu enne.

A tree common all over South India, especially along the coast. Yields a deep red-coloured and somewhat thick oil. Employed medicinally in cutaneous affections. (Hawkes.)

51. Vernonia anthelmintica, *Willd.* N.O. Compositæ.

Tam. Kattu seeragum ennai. *Tel.* Adavi jilakara noone.

Kan. Kadijirige enne.

A tall annual, common throughout India. The seeds yield the oil. Used in medicine. (Hawkes.)

EXHIBIT CONNECTED WITH THE MANUFACTURE OF STEARINE FROM THE SEEDS OF THE PINEY VARNISH TREE, VATERIA INDICA.

1. Vateria indica, *Linn.* N.O. Dipterocarpeæ. The Piney Varnish tree.

Hind. Sufed damar, Kahruba, Sandras.
Tam. Pincy maram, Dhup maram, Vallay kungiliam.
Tel. Dupada, Dupamaram, Dhupakan.
Mal. Payani, Perumpiney.

A large evergreen tree, common in the evergreen forests of the Western Ghats from Kanara to Travancore ascending to 4,000 feet. Often planted as an avenue tree. In Travancore, stearine is manufactured from the oil of the seeds and this stearine is made use of in the manufacture of candles. The oil is obtained in the following manner: The seeds are cleaned, roasted and ground into a mass. Twice the amount of water in weight as the seeds is added to this and the whole is boiled. The oil rises to the surface. The oil is further boiled and subjected to certain chemical processes. Glycerine and oleine are obtained as by-products and stearine is left in a solid form. (Watt's Dy.)

DRUGS (DRIED COLLECTION).

1 **Abies Webbiana**, *Lindl.* Himalayan Silver Fir, Conifereæ ; Tribe Abietineæ.

Hind. Talispatra.

A lofty evergreen tree, growing in the Himalayas from the Indus to Bhutan, at a height of 7,000 to 13,000 feet. (Watt's Dy.)

Dry leaves regarded as carminative, expectorant, stomachic tonic and astringent, used for asthma, bronchitis and catarrh of the bladder. (K. & B.)

2. **Abroma augusta**, *Linn.* Devil's Cotton. N.O. Sterculiaceæ.

Hind. Ulatkambal.

A forest undershrub growing in the Himalayan ranges. (Gamble). Root and Root Bark provide a valuable medicine in dysmenorrhoea. The fresh root mixed with black pepper is made into a decoction for this purpose. (Watt's Dy.)

3. **Abrus precatorius**, *Linn.* Indian or Wild Liquorice. N.O. Papilonaceæ.

Hind. Gaungchi, rati, chirmiti. *Tam.* Gundu-mani.
Tel. Guru venda. *Kan.* Gul-Ganji.
Mal. Kunni Kuru.

A twining plant ; found wild all over Southern India. The root yields an extract supposed to be similar in medicinal properties to liquorice. It has been proved to be wrong. The leaves are used to mitigate coughs. The seeds are occasionally employed externally in ophthalmia. An oil prepared from the seeds is used as a medicinal oil for the head.

4. Do. White variety, the seeds act as a poison producing vomiting and convulsions.

5. Do. Pink variety, the seeds are occasionally employed externally in opthalmia. (Watt's Dy.)

6. **Abutilon indicum**, *G. Don.* The Country Mallow N.O. Malvaceæ

Hind. Kanghi, Jhampi. *Tam.* Tutti.
Tel. Tuttura benda, nugu benda. *Kan.* Shrimudrigra.
Mal. Tutta.

A small shrub, common throughout India in all parts, as roadside, wasteland, etc. Leaves, seed and roots are valuable. The leaves yield a mucilaginous extract used as a demulcent. From the roots a cooling drink is prepared which is given in fevers. The seeds are considered laxative and demulcent and are given in the treatment of coughs. (Watt's Dy.)

7. **Acacia arabica**, *Willd.* Babul. N.O. Mimoseæ.

Hind. Babul. *Tam.* Karuvel.
Tel. Nallatumma, Barburamu, Tummachettu. *Mal.* Karu-Velakam.

A tree found all over Southern India and Bengal ; especially on the bunds of rivers, tanks, lakes, paddy fields, etc. The gum is procured by making incisions in the bark, and the sap running out hardens

into lumps of various sizes and shapes. It is used in coughs, rheumatism and the mucous discharges. It is also a good food in diabetes. (Drury.)

8. **Acacia concinna**, *D.C.* N.O. Mimoseæ.

Hind. Rithā, Kochi. *Tam.* Shikai.
Tel. Shikaya. *Mal.* Chinikai.

A climbing plant, found all over Southern India, Bengal and Assam. The pods are used externally as a detergent. In small doses the pods serve as a tonic and in increased doses as a purgative. The pods are used as an aperient in bilious affections. (Watt's Dy.)

9. **Acacia Farnesiana**, *Willd.* N.O. Mimoseæ.

Hind. Vilayati Kikal, Vilayati babul. *Tam.* Piy-Velam.
Tel. Piyi-tumma, Kampu-tumma, Naga-tumma. *Mal.* Pivelam.

A small tree, common all over South India. The bark is used as an astringent. The pods yield a valuable fluid which is used in medicine. (Watt's Dy.)

10. **Acacia ferruginea**, *D.C.* N.O. Mimoseæ.

Tam. Shimai-Velvel. *Tel.* Vuni, Anasandra.

A tree common on the Coromandel Coast, Courtallam, and N. Circars. The bark has astringent properties. A decoction of the bark with ginger and other ingredients is employed as an astringent wash for the teeth. (Drury.)

11. **Acalypha indica**, *Linn.* N.O. Euphorbiaceæ.

Hind. Kuppi, Khokalī. *Tam.* Kuppameni.
Tel. Murrunda. *Kan.* Kuppi.

A small annual, found as a weed in all parts all over South India. The root, bruised and steeped in hot water, is used as a cathartic and the leaves as a laxative in decoction. The decoction of the leaves is used for ear-ache, and the expressed juice for bronchitis, etc. Mixed with common salt, the leaves are applied externally in scabies. (Drury.)

12. **Achyranthes aspera**, *Linn.* N.O. Amarantaceæ.

Hind. Latjira, Chirchitta. *Tam.* Nayurivi.
Tel. Uttareni. Kan. Uttarem.

Mal. Katalati.

A small shrub of about 6 feet. A common wayside plant all over South India and Bengal. The whole plant has astringent and dieuritic properties assigned to it. The decoction of the plant is used for various diseases such as dropsy, boils, piles, etc. The seeds and leaves are considered emetic and are used in hydrophobia and snake bites. (Watt's Dy.)

13. **Aconitum ferox**, *Wall.* N.O. Ranunculaceæ.

Hind. Bish, Singyābis, Singyā. *Tam.* Vashnair.
Tel. and *Kan.* Vasnabi. *Mal.* Valsanabhi.

A small herbaceous plant growing to a height of 2—3 feet and possessing large deep blue flowers. The plant is found in the tops of Himalayas above an elevation of 10,000 feet above the sea level.

The root forms a very good medicine for chronic rheumatism. Mixed with other drugs, it is used for a variety of diseases such as cholera, intermittent fever, toothache, snake bite, etc. (Drury.)

14. Aconitum heterophyllum, *Wall.* N.O. Ranunculaceæ.

Hind. Atis, Atvikā. *Tam.* Ativadyam.
Tel. Ativasa.

A shrub with blue flowers, found on the Himalayas. The root is a valuable tonic and febrifuge. (Drury.)

15. Acorus calamus, *Linn.* The sweet flag. N.O. Aroideæ.

Hind. Bach, gor bach. *Tam.* Vasambu.
Tel. Vasa. *Kan.* Baje.
Mal. Vashampa.

It is a perennial semi-aquatic plant with a root stock. It is found growing in marshy places in Malabar. The rhizome has aromatic properties. Hence this is used as an addition to tonics and purgatives. This is administered in cases of low fevers also. (Drury.)

16. Actinopteris dichotoma, *Forsk.* N.O. Filicineæ.

A common hill plant. This grows in the Nilgiris up to a height of 2,000 feet. (Beddome Ferns.) The whole plant used as an anthelmintic. (K. and B.)

17. Adansonia digitata, *Linn.* The Baobab or Monkey bread tree. N.O. Malvaceæ.

Hind. Gorakh amli. *Tam.* Pappara puliyamaram.

A tree of moderate height and a thick trunk. Naturalized in India. Grows well in Madras and Negapatam. The bark is used as a substitute for quinine. Found to be generally effective. (Drury.)

18. Adhatoda Vasica, *Nees.* N.O. Acanthaceæ.

Hind. Adārsa, Adulasā, Arūsā. *Tam.* Adathodai.
Tel. Addasaram. *Mal.* Atalotakam.

A shrub of 8—10 feet. Found distributed all over South India, Bengal and Nepaul. The juice of the leaves is mixed with juice of fresh ginger and administered to persons suffering from asthma, coughs and ague. The leaves form a medicine to cattle also. (Drury.)

19. Ægle Marmelos, *Corr.* N.O. Rutaceæ. The Bael or Bengal Quince.

Hind. Spriptal siphal. *Tam.* Vilva.
Tel. Bilva. *Kan.* Bilpathre.

A middle-sized tree. This is found all over tropical India and in Bengal. The rind of the fruit, the fruit pulp, leaves, etc., are all valuable. The unripe fruit which is dried is used in diarrhœa and dysentery (K). The bark is used in the case of pālpitation of heart and the leaves in asthma. (Drury.)

20. Ailanthus excelsa, *Roxb.* N.O. Simarubeæ.

Tam. and *Mal.* Peroomarum. *Tel.* Peddamanoo.
Hind. Maha rukha, limbado.

A large tree, common in the Northern Circars and Coimbatore. (Gamble.) The bark has aromatic properties and is a useful medicine for dyspepsia. (Drury.)

21. Ailanthus malabarica, *Dec.* N.O. Simarubeæ.

Tam. Mattipal marapattai. *Tel.* Maddipal manu patta.
Kan. Matti maratha patte.

Tree, found in Travancore and Malabar. The bark is used in dyspepsia. Also a valuable tonic and febrifuge. (Drury.)

22. Alangium Lamarckii, *Thw.* N.O. Cornaceæ.

Tam. Azhingi Ver Pattai. *Tel.* Uduga Veru patta.
Kan. Ankola beru patte. *Hind.* Akola, dhera.

A small tree, common on the hedges in village parts in South India. The root bark is used as an anthelmintic and purgative. The Sanskrit writers describe it as Aukota and describe it as a useful medicine in leprosy and skin diseases. (Watt's Dy.)

23. Albizzia Lebbek, *Benth.* N.O. Mimoseæ. The Siris Tree.

Tam. Vaghai Virai. *Tel.* Dirsana Vittulu.
Kan. Baghi Bija. *Hind.* Siras, Sirai, Kelsis.

A large, spreading beautiful tree, both wild and cultivated. Found in the Himalayas tracts, South India and Burma, ascending to 5,000 feet in altitude. Found grown on the side of the roads in Madras, for shade. The seeds are used as medicine in ophthalmia. They are also astringent and used in piles, diarrhœa, etc. An oil is obtained from the seeds and is used for leprosy. (Watt's Dy.)

24. Albizzia odaratissima, *Benth.* N.O. Mimoseæ.

Tam. Karu Vaghai pattai. *Tel.* Shinduga patte.
Kan. Biliwara patte. *Hind.* Sira, bersa, basa.

A large spreading tree, found common all over the Coromandel and Malabar. The bark is used as external medicine for leprosy and ulcers. (Watt's Dy.)

25. Aleurites molucanna, *Willd.* The Belgaum or Indian Walnut or the Candle Nut. N.O. Euphorbiaceæ.

Tam., Tel. and *Kan.* Nattuakrotu.

Hind. Akrot, Akola.

A large handsome tree distributed over South India and common in Madras. An oil is extracted from the kernel of the nut. Used as a mild purgative and approaches the castor oil in its effects. (Watt's Dy.)

26. Allium sativum, *Linn.* N.O. Liliaceæ. Garlic.

Tam. Vellai poondu. *Tel.* Tella gadda.
Kan. Belluli. *Mal.* Velluli.

Hind. Lasan, Lahsan.

A cultivated bulb, common all over South India. The bulbs are numerous and are enclosed in a common membranous covering. The bulb is a good tonic, expectorant and stimulant. Used in many ways by medical men.

27. Alpinia Galanga, *Sw.* The greater Galangal. N.O. Scitamineæ.

Tam. Perarattai. *Tel.* Peddathumparashtakam.
Kan. Dumparasoni. *Hind.* Kulanjan, bara kalijan.

A perennial plant, native of Java and Sumatra and now cultivated in South India. The rhizomes are aromatic, pungent and bitter and are used in fever, rheumatism and catarrhal affections. (K. and B.)

28. Alpinia officinarum, *Hance.* The lesser galangal. N.O. Scitamineæ.

Tam. Sittarattai. *Tel.* Sannathumparashtakam.
Hind. Kulinjan.

A herbaceous plant with rhizomes. The rhizome is stomachic and tonic. Largely employed by Indian practitioners. (Watt's Dy.)

29. Amarantus spinosus, *Linn.* N.O. Amarantaceæ.

Tam. Mullukirai. *Tel.* Mundla Kura.
Kan. Mullarave.

A small erect herb, found in the plains of India Emollient poultices are made of the bruised leaves. The root has been found useful in the treatment of gonorrhœa and eczema. (K. and B.)

30. Ammania baccifera, *Linn.* N.O. Lythraceæ.

Tam. Kallurini. *Tel.* Agnivendapu chettu.
Mal. Kallum vanchi. *Hind.* Jangali mehndee.

A small herbaceous plant, generally met with in wet places in South India. The leaves are very acrid and are used to raise blisters in rheumatic pain, fevers, etc. (K. and B.)

31. Anamirta cocculus, *W. & A.* N.O. Menispermaceæ.

Tam. Kakkai Kollivirai. *Tel.* Kakamari Vittulu.
Kan. Kakumari bija. *Hind.* Kakmari.

Twining plant, distributed over Malabar, Concans and Circar mountains. The seeds contain certain alkaloids which are poisonous. They are used to cure inflammations, itches, etc. (Drury.)

32. Andrographis paniculata, *Nees.* The Great. N.O. Acanthaceæ.

Tam. Nelavembu. *Tel.* Nelavemu.
Hind. Kiryāt, Mahatiā. *Kan.* Nelabure.
Mal. Nelaveppu.

An annual of 1—2 feet, found common in dry places all over South India. The plant is highly valued for its stomachic and tonic properties. It is occasionally used in cholera and dysentery. The plant is used in Madras as an antidote for bites of snakes. (K. and B.)

33. Anisochilus carnosus, *Wall.* N.O Labiatæ.

Tam. Karppura valli. *Tel.* Karppura valli, jomamuaku, rogachettu.
Hind. Panjiri-kā-pāt. *Kan.* Doda patri.
Mal. Chomara, kattu-kurukka, kurkka.

A small herbaceous plant, growing in clefts of rocks among mountains in Northern Circars and Malabar. The juice of the leaves mixed

with sugar and human milk is given for cough to children. The juice mixed with gingelly oil and sugar forms an excellent cooling liniment for the head. (K. and B.)

34. Anisomeles malabarica, *R. Br.* N.O. Labiatæ.

Tam. Peymerattai. *Tel.* Mogabira.
Mal. Peyimerattai or karintumba.

A small shrub of 2—5 feet, common all over South India The juice of the leaves in infusion is given to children in colic, indigestion and fevers arising from teething. The leaves assist digestion generally. (Watt's Dy.)

35. Anona squamosa, *Linn.* The Custard Apple. N.O Anonaceæ.

Tam. Seetha ver. *Tel.* Seetha veru.
Hind. Sharīfah, sitāfal. *Kan.* Seetha beru.

A small tree of 15—20 feet. It is cultivated all over India. The root is regarded as a drastic purgative and is administered in acute dysentery. It is also useful for spinal diseases. The ripe and unripe fruits, seeds and leaves, all are used as medicines. (K. and B.)

36. Anthocephalus Cadamba, *Bth. & Hook. f.* N.O. Rubiaceæ.

Tam. Vellai kadambai pattai. *Tel.* Kadamba patta.
Hind. Kadam, kadamb. *Kan.* Arsanatege patte.

A large deciduous tree, wild in Bengal and West Coast. The bark is used as febrifuge and tonic. (Watt's Dy.)

37. Argemone mexicana, *Linn.* The Prickly Poppy. N.O. Papavaraceæ.

Tam. Brammadandu virai. *Tel.* Brammadandu vittulu.
Hind. Sial kanta, bharband. *Kan.* Dattoori bija.

An introduced spiny herbaceous annual, common in all waste places, roadsides, etc. Appears in the cold season. The seeds have narcotic properties. The oil which is expressed from the seeds is a useful remedy for headaches and skin disease. W. Hamilton, Esq., M.D., writes "That the materia medica hardly presents a more valuable purgative." He advocates it in colic arising from constipation of the bowels, cholera, cramps, etc. An infusion of the plant is regarded as diuretic. (Drury.)

38. Argyreia speciosa, *Sweet.* The Elephant Creeper. N.O. Convolvulaceæ.

Tam. Kadal-palai. *Tel.* Samudra pala veru.
Hind. Samandar-kā-pāt. *Mal.* Samudra pala ver.

A twining plant, common on the hedges in South India and abundant in Malabar forests. The leaves are used in the preparation of emollient poultices and also in cutaneous complaints in the form of an external application. (Watt's Dy.)

39. Aristolochia bracteata, *Retz.* The Bracteated Birth Wort. N.O. Aristolochiaceæ.

Tam. and *Mal.* Aduthinnappalai. *Tel.* Gadide gada-para-aku or kadapara.
Hind. Gandati.

A trailing herbaceous plant, common in cultivated places of South India, Travancore and banks of Jumna and Ganges, commonly found in black soil. Every part of the plant is nauseously bitter. In cases of gripes, two of the fresh leaves are rubbed up with water and given once in 24 hours. (Watt's Dy.) Fresh bruised and mixed with castor oil, they are considered a valuable remedy in obstinate cases of that kind of Psora called in Tamil Carpang. It is valued for its purgative properties. (Drury.)

40. Aristolochia indica, *Linn.* The Indian Birth Wort. N.O. Aristolochiaceæ.

Tam. Ichchuramuli. *Tel.* Iswara veru.
Hind. Isharmul. *Kan.* Iswaree beru.
Mal. Iswara muri.

A twining perennial, common in jungles and distributed in South India, Bengal and Travancore. The root possesses emmenagogue and antiarthritic properties. It is regarded as an antidote for snake bite. It is also used in fevers. (K. and B.)

41. Artocarpus integrifolia, *Linn.* Jack tree. N.O. Urticaceæ.

Tam. Pila. *Tel.* Panasa.
Hind. Kānthāl. *Kan.* Halasa.
Mal. Pilavoo.

A large tree with a strong trunk. Distributed all over the tropical India, especially in Malabar. The young leaves are used in skin diseases. The root is taken internally in cases of diarrhœa. The unripe fruit is used for its astringent properties. (Watt's Dy.)

42. Asparagus racemosus, *Willd.* N.O. Liliaceæ.

Tam. Tannir muttan. *Tel.* Challa gaddulu.
Hind. Satawār, shakakul. *Kan.* Majjige gadde.
Mal. Shatavali.

A straggling climbing shrub distributed all over India. It is used chiefly as a demulcent in veterinary medicine. The root with the bark removed is also used in cases of diarrehœa and dysentery. (Watt's Dy.)

43. Asparagus sarmentosus, *Willd.* N.O. Liliaceæ.

Tam. Tannir muttan. *Tel.* Challa-gaddalu.
Hind. Shakāqul. *Kan.* Majjie-gadde.
Mal. Shatavali.

A climber, common in the Deccan and upper India. The fresh root is nutrient and demulcent. It is also used in cutaneous diseases. (Watt's Dy.) See fresh specimen in bottle in Hall I.

44. Averrhoa Carambola, *Linn.* N.O. Geraniaceæ.

Tam. Tamarathankai. *Tel.* Pulasa Kayalu.
Hind. Karmal, Kamaranga. *Mal.* Chadurappuli or Tamarathankai.

A tree of 15—20 feet height. It is extensively cultivated for its fruits which are edible. It is distributed all over India. The fruit has a cooling effect. The dried fruit is given in fevers. (Watt's Dy.) See fresh specimen in bottle in Hall I.

45. Azima tetracantha, *Lam.* N.O. Salvadoraceæ.

Tam. Chengan ver. *Tel.* Uppi veru.
Hind. Kāntagurkāmai.

A common thorny shrub, growing plentifully in the Deccan, in all situations. It is in flower and fruit most part of the year. The root bark is used in muscular rheumatism. The juice of the leaves is used to relieve the cough of asthma. (Watt's Dy.)

46. Balanites Roxburghii, *Planch.* N.O. Simarubeæ.

Tam. Nanjunda. *Tel.* Garapandu.
Hind. Ingua, Hingota. *Mal.* Nanchunta.

A small thorny tree, common in the drier parts of India. It is found in Dehra Dun also. The seeds are given in coughs and the fruits are used as purgatives. (Watt's Dy.)

47. Bambusa arundinacea, *Retz.* N.O. Gramineæ.

Tam. Moongil. *Tel.* Veduru.
Hind. Bans, magarbāns. *Kan.* Bidaru.

The common erect bamboo, distributed all over South India. Also cultivated in North India. A sileceous secretion is formed on the joints of the stem in the female plants. This seems to happen when the stem disorganizes due to a state of disease or malformation. This sileceous secretion is made up mostly of silica, a little lime and some vegetable matter. It is not affected by fire or acids and is said to be a very useful medicine for paralytic complaints and poisonings. (Drury.)

48. Bassia latifolia, *Roxb.* The Butter or Mahua Tree. N.O. Sapotaceæ.

Tam. Illuppa maram. *Tel.* Ippi.
Hind. Mahwā mahuā. *Kan.* Ippe or Kadu-ippe-gida.
Mal. Poonam.

A large deciduous tree, indigenous in the forests of the Central Provinces. Sparingly distributed in the Madras Presidency. The seeds yield a thick concrete oil which is recommended to be applied to the head in cephalalgia. (Watt's Dy.)

49. Benincasa cerifera, *Sair.* The White Gourd Melon. N.O. Cucurbitaceæ.

Tam. Kalyanapooshini. *Tel.* Boodithi gummadi.
Hind. Kumara, Kudīmah. *Kan.* Buthe kumbala kayi.
Mal. Kumpalam.

A weak stemmed plant creeping or climbing by tendrils. Mostly cultivated for its fruits. The seeds possess anthelmintic properties and are useful in cases of tænia. The expressed oil of the seeds in doses of half an ounce every two hours and followed by an aperient is said to be very efficacious. (Watt's Dy.)

50. Brassica alba, *H.F. & T.T.* White Mustard seeds. N.O. Cruciferæ.

Tam. Vellai kadugu. *Tel.* Thella avala.
Hind. Sufedrai, Sufed-rāyān. *Kan.* Bili sasave.

A small herbaceous plant, mostly cultivated for its seeds. The seeds are used as poultice for inflammatory affections, rheumatism, etc. It is also a laxative in moderate doses. The oil is a good remedy for sore throat, and cold in the head.

51. Cæsalpinia Bonducella, *Fleming.* The Physic-Nut. N.O Cæsalpinieæ.

Tam. Gejjakai virai. *Tel.* Gejjakaya vittulu.
Hind. Karanjū, Karanjavā. *Kan.* Gajkai bija.

A large prickly climbing shrub, common throughout India, in hedges or climbing over bushes, usually near villages. Most common along the sea coast places. The seeds are large and grey and look like marbles. The shells of the seeds are broken and the kernel mixed with black pepper serves as a good tonic and preventive against fevers.

52. Cæsalpinia pulcherrima, *Swartz.* The Barbados Pride. N.O. Cæsalpinieæ.

Tam. Myil konnai poo. *Kan.* Ratnagandhi or Kenchige hoovu.

A small tree, cultivated in gardens throughout India. The flowers and leaves are used in Indian medicine.

53. Calophyllum inophyllum, *Linn.* The Alexandrian Laurel. N.O Guttiferæ.

Tam. Pinna kottai. *Tel.* Ponna Vittu.
Hind. Surpan, Surpunka. *Kan.* Surahonne kayi.

An evergreen, middle-sized ornamental tree or shrub, common in South India and Western peninsula. The oil is useful as an external application in rheumatism. It is also used in the treatment of gonorrhœa and gleet. (Watt's Dy.)

54. Calotropis gigantea, *R. Br.* N.O. Asclepiadeæ.

Tam. Erukkan ver pattai. *Tel.* Jilledu veru patta.
Hind. Mudar. *Kan.* Ekka beru patte.
Mal. Yerukuver patte.

A middle-sized shrub with all its young parts covered by a white powder. It is common in waste lands in South India. The root bark is considered to promote the secretion and to be useful in skin diseases, intestinal worms, coughs, etc. The root bark is also used in the treatment of scrotum and elephantiasis. (Watt's Dy.)

55. Canarium strictum, *Roxb.* Black damar tree. N.O. Simarubeæ.

Tam. Karapu Kongiliam. *Tel.* Nallarojan.
Hind. Kālā dammar. *Kan.* Manda-dhup, Valdhupada.
Mal. Thelli.

A very large straight deciduous tree, distributed in Western Peninsula, Concan, etc. (Gamble). The gum is used for making plasters and mixed with gingelly oil; it is used for rheumatic pains. (Watt's Dy.)

56. Cannabis sativa, *Linn.* Hemp seed. N.O. Urticaceæ.

Tam. Ganja virai. *Tel.* Ganja vittulu.
Hind. Bhāng, Kinnab. *Kan.* Bhangi bija.

A tall erect annual herb, wild in the North-west Himalaya and is cultivated throughout India. The leaves are officinal in the Indian and British Pharmacopœias. Its uses are many. Mention may be made here about its use in cholera, children's convulsions and other nervous affections. (Watt's Dy.)

57. Capsicum frutescens, *Linn.* Chillies or Spur pepper N.O. Solanaceæ.

Tam. Milagai. *Tel.* Mirapakāya.
Hind. Lalmirch. *Kan.* Menasura kayi.
Mal. Melaka.

A perennial herb, cultivated throughout India for its fruit. The fruits and seeds are used in Indian medicine in dyspepsia, cholera and intermittent fevers. The chilli is a good stomachic. (Watt's Dy.)

58. Carapa moluccensis, *Lam.* N.O. Meliaceæ.

Tam. Kandalanga.

An evergreen tree, common throughout India and inhabiting muddy sea coasts. It is therefore a plant of the mangroove formations. The bark has astringent and bitter properties. It is a good tonic and employed in diarrhœa, cholera, etc. (K. and B.)

59. Cardiospermum helicacabum, *Linn.* Balloon Vine. N.O. Sapindaceæ.

Tam. Modaikittan chedi. *Tel.* Nallagulisienda chettu.

A small herbaceous climber with axillary branches modified into tendrils, common throughout India. The root is a laxative and stomachic. The whole plant rubbed up with water is applied to rheumatism and stiffness of the limbs. (Watt's Dy.)

60. Carica papaya, *Linn.* The Papaw tree. N.O. Passifloreæ.

Tam. Pappali virai. *Tel.* Bappayee vittulu.
Kan. Parangee bija. *Mal.* Pappaya vira.
Hind. Papaya, popaiyah.

A small tree, usually cultivated in gardens throughout India. It is unbranched and is not unlike a small palm. It has milky juice. The seed has anthelmintic virtues. They are also considered vermifuge. (Watt's Dy.)

61. Carthamus tinctorius, *Linn.* N.O. Compositæ.

Tam. Kusamba chedi. *Tel.* Agni chettu.
Hind. Kusum, Kasumba.

An annual herbaceous plant with large orange coloured flower heads, cultivated all over India as a dye plant. The flowers dried when taken in one drachm, acts as a cure in jaundice. The seeds are laxative. (Watt's Dy.)

62. Carum Carni, *Linn.* Caraway. N.O. Umbelliferæ.

Tam. Simai sombu. *Tel.* Shima Sompu.
Hind. Zira.

An annual herb, cultivated for its seeds on the plains and hills of India. The fruits are aromatic, carminative and astringent. (Watt's Dy.)

63. Carum copticum. *Benlu.* The Bishop's weed. N.O. Umbelliferæ.

Tam. Omam. *Tel.* Vomamu.
Kan. Voma. *Hind.* Ajowan, Ajwain.

An erect annual, cultivated throughout India for its fruits. The fruits are highly valued for their carminative, stimulant and tonic properties. The fruits are taken alone or in conjunction with pepper and betel leaves. They are useful in diarrhœa, indigestion and cholera. The omum water which is highly valued as a stomachic and tonic is prepared from the fruits.

64. Carum nigrum, *Roxb.* Black Caraway. N.O. Umbelliferæ.

Tam. Shimai seeragam. *Tel.* Shimai jilakara.
Kan. Shimai jirige. *Mal.* Shimai jirakam.
Hind. Shah-zirah.

An annual herb, probably a variety of carum carni, cultivated throughout India. The seeds are used as a carminative.

65. Caryophyllus aromaticus, *Linn.* Cloves. N.O. Myrtaceæ.

Tam. Krambu. *Tel.* Lavangulu.
Kan. Lavanga. *Mal.* Karambu.
Hind. Long, Laung.

A tree and a native of the Moluccas. Extensively cultivated in Southern India. The young flower buds form the cloves of commerce. The cloves are a tonic, and carminative and are therefore used in dyspepsia, and vomiting. An infusion of cloves is used to appease thirst. (Watt's Dy.)

66. Cassia absus, *Linn.* N.O. Cæsalpinieæ.

Hind. Chākût, banar *Tam.* Mulaippal virai.

An erect annual, 1—2 feet high, with grey, bristly viscose hairs. It is distributed all over India. The seeds are used in the treatment of eye diseases. It is also used for other complaints such as dyspepsia, headache, etc. (Watt's Dy.)

67. Cassia alata, *Linn.* N.O. Cæsalpinieæ.

Tam. Shimai agathi ilai. *Tel.* Shimai ariseeaku.
Kan. Shimai agase ele. *Mal.* Shimai akatti ila.
Hind. Dadmurdan, Dāt-ka-pāt.

A small shrub with very thick finely downy branches, common all over tropical India. The leaves are useful as an external application in skin diseases. (Watt's Dy.).

68. Cassia angustifolia, *Vahl.* Indian or Tinnevelly Senna. N.O. Cæsalpinieæ.

Tam. Nattunilavarai. *Tel.* Nelatangedu.
Kan. Nela varike. *Mal.* Nila vaka.
Hind. Hindisana.

Not a native of India but is widely cultivated. The leaves are used as a simple and active purgative. (Watt's Dy.)

69. Cassia auriculata, *Linn.* The tanner's cassia. N.O. Cæsalpinieæ.

Tam. Avaram or Avari. *Tel.* Tangedu.
Kan. Avareke, tengedu. *Mal.* Avara or ponnaviram.
Hind. Tarwar, Tarvar.

A tall shrub, commonly distributed all over India. The young branches and underside of the leaves are covered with grey downy hairs. The bark is a good substitute for oak bark and is therefore used for gargles, enemas, etc. The seeds powdered are useful as a local application for ophthalmia. The flower buds have astringent properties and are used in the form of a drink. (Watt's Dy.)

70. Cassia fistula, *Linn.* The Indian laburnum. N.O. Cæsalpinieæ.

Tam. Sarakonnai. *Tel.* Reyalu, Suvarnam.
Kan. Kakee. *Mal.* Konak-kaya.
Hind. Amaltās, girmālah.

A moderate-sized deciduous tree, common in tropical India. The flowers are made into a confection known as Gulkand and viewed as a febrifuge. The leaves are used in the treatment of paralysis and rheumatism. (Watt's Dy.)

71. Cassia Sophera, *Linn.* N.O. Cæsalpinieæ.

Tam. Ponnavarai, Periyatagara ilai. *Tel.* Paidee tangedu aku.
Mal. Ponnam tagara ela. *Hind.* Banār Kāsunda.

A shrub, common throughout India. The infusion of the leaves is taken internally for venereal diseases. The leaves are also considered as a specific in ringworm disease. (Watt's Dy.)

72. Cassia Tora, *Linn.* The Fœtid cassia. N.O. Cæsalpinieæ.

Tam. Ooshithagarai tarotah. *Tel.* Tagairsha chettu.
Hind. Chakundā.

A gregarious annual under shrub of 1—2 feet in height, common throughout the tropical parts of India. The leaves are used as an aperient. The seeds and leaves both constitute a good remedy for skin diseases especially for ringworm and itch. (Watt's Dy.)

73. Casuarina equisetifolia, *Forst.* N.O. Casuarineæ.

Tam. Savukku Pattai. *Tel.* Chavakkupatta.
Hind. Janglisaw.

A large evergreen tree, a native of Australia and extensively cultivated in India, especially on the east side of the Bay of Bengal. The bark is an astringent and it is employed in diarrhœa and dysentery. In infusion it is also used as a tonic. (K. and B.)

74. Celastrus paniculatus, *Willd.* N.O. Celastrineæ. *Sansk.* Jyotishmati.

Tam. Valulvai Viraj. *Tel.* Malkangunni Vittulu.
Hind. Mal Kangin. *Mal.* Valuzhuva Vittu.

A scandent shrub of the outer Himalayas from the Jhelum to Assam ascending to 4,000 feet. It is also found throughout the hills districts of India, Burma and Ceylon. The seeds are highly valued as a stimulant and aphrodisiac. They are used both internally and externally in cases of rheumatism, gout, leprosy, paralysis, etc. It is also believed that the seeds have the property of stimulating the intellect and sharpening the memory. (K. and B.)

75. Cheilanthas mysorensis, *Wall.* N.O. Filices.

Tam. and *Tel.* Mymasiki.

Found on dry rocks on hill sides up to 3,000 or 4,000 feet. The plant is employed in Indian medicine.

76. Chloroxylon Swietenia, *D.C.* The Indian Satin Wood. N.O. Meliaceæ.

Tam. Vummai porasai ilai. *Tel.* Billu akulu.
Hind. Dhoura, girya. *Kan.* Huragalu, ele.

A moderate-sized deciduous tree. It is common in Western Peninsula, from the Konkan to the Nilgiris. The bark is astringent and prescribed by Indian doctors. The leaves are applied to wounds and also used in rheumatism. (K. and B.)

77. Cichoriumi endivia, *Linn.* The garden endive. N.O. Compositæ.

Tam. Kashni Virai. *Tel.* Koshee Vittulu.
Hind. Kásin.

A perennial glabrous herb, distributed in Northern India. The seeds are used in sherbets. The plant is regarded by hakims to be a cooling medicine. (K. and B.)

78. Cinchona officinalis, *Hook.* Cinchona. N.O. Rubiaceæ.

A straggling tree, ascending up to a height less than 20 feet. Cultivated in the Nilgiri hills. Quinine is obtained from the bark, the uses of which are too well known.

79. Cinchona robusta. Cinchona. N.O Rubiaceæ.

A tree, cultivated in the Nilgiris. The bark yields quinine.

80. Cinchona succirubra, *Pavon.* Cinchona. N.O. Rubiaceæ.

A tree, cultivated in the Nilgiris. It has a sturdier stem than cinchona officinalis and grows to a height of 50 feet. It yields quinine sparingly. It is rich in cinchonine and cinchonidine which are also employed in British Pharmacopœia. (Watt's Dy.)

81. Cinnamomum iners, *Reinw.* N.O. Laurineæ.

Tam. Kattukaruvappattai. *Tel.* Adavi lavangapattai.
Hind. Jangli-darchini. *Kan.* Kadulavangepatte.
Mal. Katukarana Tolu.

A large tree, native of Sumatra and cultivated in South India. The bark on careful drying and preparation, yields cassia liqua of good quality. (K. and B.)

82. Cinnamomum sp. N.O. Laurineæ. Perhaps C. iners, *Reinw.*

Tam. Tirumanjanna pattai.

A tree, cultivated in South India. The inner bark possesses in the fresh state cinnamonic odour and taste and by careful drying and preparation yields cassia liqua.

83. Cinnamomum zeylanicum, *Breyn.* N.O. Laurineæ.

Tam. Lavanga pattai. *Tel.* and *Mal.* Lavanga patte.
Hind. Dalchini. *Kan.* Dalchini.

A large tree, all parts of it very aromatic. Experimentally cultivated in South India. The bark is officinal in the British Pharmacopœia. It is carminative, aromatic and stimulant and therefore used in disorders of bowels such as diarrhœa, gastric irritation, flatulence, etc. (K. and B.)

84. Cissampelos Pareira, *Linn.* False Pariera Brava. N.O. Menispermaceæ.

Tam. Vatatiruppee. *Tel.* Pata.
Hind. Dakh, nirbisi. *Kan.* Padavali.

A lofty climber with herbaceous branches on a very short stout stem. It grows in tropical and sub-tropical India ascending up to 4,000 feet. The bark is a tonic and also astringent. It is used in the diseases of the urinary organs. It exercises an astringent and sedative action on the mucous membrane of the genito-urinary organs. (Watt's Dy.)

85. Citrullus vulgaris, *Schrad.* The Water Melon. N.O. Cucurbitaceæ.

Tam. Pichcha virai. *Tel.* Karumboja vittulu.
Hind. Tarbiez. *Kan.* Kargunje.

A climbing or trailing hispid, annual, cultivated all over India. The seeds are used as a cooling medicine. They are also considered diuretic and strengthening. (K. and B.)

86. Citrus aurantium, *Linn.* The sweet Orange. N.O. Rutaceæ.

Tam. Kichchili pazham. *Tel.* Kiththali pandu.
Hind. Narangi. *Kan.* Kiththale hannu.

A small tree, cultivated in India. The dried outer portion of the rind possesses stomachic and tonic properties. It is useful in atoning dyspepsia and in general debility. (K. and B.)

87. Cleome viscosa, *Linn.* N.O. Capparideæ.

Tam. Naikadugu chedi. *Tel.* Kukka-avalu chettu.
Hind. Kanphuti, Purhur. *Kan.* Naibela gida.

Mal. Kat-kuddaghu.

An annual herb, 1—3 feet, common throughout tropical India, in waste places, beach and roadsides. The seeds are used as anthelmintic and carminative. The leaves bruised are used for counter irritation and blistering. (K. and B.)

88. Clerodendron serratum, *Spreng.* N.O. Verbenaceæ.

Tam. Vathamadakkee. *Tel.* Gantiparangee.
Hind. Barangi. *Mal.* Cherutekka.

A handsome shrub, from the Himalayas east of the Sutlej to Ceylon. The root is used in catarrhal affections and in fever. The leaves boiled with butter and oil forms an ointment useful in cephalalgia and opthalmia. (K. and B.)

89. Clitoria Ternatea, *Linn.* N.O. Papilonaceæ.

Tam. Kakanamgodi virai. *Tel.* Dintana, tella dintana.
Hind. Visnukranti, kalizer. *Kan.* Gilkarnike bija.
Mal. Shanku pushpa chedi vittu.

A common tender climber, all over India on the hedges and commonly grown in the gardens also. The seeds are purgative and aperient. The roots are laxative and diuretic, useful in fevers. (K. and B.)

90. Cochlospermum gossypium, *D.C.* The white silk Cotton tree. N.O. Bixineæ.

Tam. Tanaku pisin. *Tel.* Konda gogu banka.
Hind. Kumbi, gabdi, ganiar.

A small deciduous tree common on dry hills and also cultivated. The gum is used in coughs and in gonorrhœa. (*Indian Medical Gazette*, 1875, p. 39.)

91. Corallocarpus epigæa, *Hook. f.* N.O. Cucurbitaceæ.

Tam. Akasagerudan kizhangu. *Tel.* Nagadonda gadda.
Hind. Akās-gaddah, ākāsgaddah. *Mal.* Kollankova kizhauna.
Kan. Akasagaruda gadde.

A small herbaceous annual climber having large roots which are tuberous. It is common all over India. The tuber is powdered and used in dysentery and in old venereal complaints. It is also considered in Deccan and Mysore to be a remedy for snake bite. (K. and B.)

See fresh specimen in bottle in Hall I.

92. Cordia obliqua, *Willd.* N.O. Borragineæ.

Tam. Narvilu pazham. *Tel.* Botuka pandu.

A moderate-sized tree, common in Western India and Deccan peninsula. The fruit is used as an expectorant and astringent. (K. and B.)

93. Coriandrum sativum, *Linn.* Coriander. N.O. Umbelliferæ.

Tam. Koththamali. *Tel.* Dhaniyalu.
Hind. Dhanya. *Kan.* Koththumbari.

A small annual herb. It is cultivated all through India. The leaves and fruits are officinal in both Indian and British Pharmacopœias. The fruits and leaves are carminative, tonic, refrigerant and diuretic. (K. and B.)

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94. Coscinium fenestratum, *Colebrooke.* N.O. Menispermaceæ.

Tam. Maramanjal. *Tel.* Mana pasapu.

Kan. Maratha arisana.

A woody climber, common in Central and South India, Malabar and Ceylon. The root is used in the hospitals of the Madras Presidency as an efficient bitter tonic. It is a good substitute for cinchona and gentian or calumba. It is used in fevers and certain forms of dyspepsia. (K. and B.)

95. Cratæva religiosa, *Forsk.* N.O. Capparideæ.

Tam. Maravalingam pattai. *Tel.* Ussili patte.
Hind. Barua, barun, bilari. *Kan.* Nirvala patte.

Mal. Nirvala tholu.

A moderate-sized tree, near streams in Malabar and Kanara, and cultivated elsewhere in India. The bark is demulcent, sedative, alterative and tonic and useful in urinary complaints, gastric irritation, fever and some mild forms of skin diseases. (K. and B.)

96. Crinum asiaticum, *Linn.* N.O. Amaryllideæ.

Tam. Vizha mungil. *Tel.* Visha mungali, kesara chettu.

Hind. Chindar kamval, pindar.

Herbs with large coated bulbs and cultivated in Indian gardens. The root is officinal in the Indian Pharmacopœia and used as an emetic and diaphoretic. (K. and B.)

97. Crocus sativus, *Linn.* The Saffron. N.O. Irideæ.

Tam., Tel. and *Kan.* Kungkumpoo *Hind.* Kesar, zafran

A perennial herb, with a root stock, in the form of a sheathed corm. Sheaths of corms closely reticulate. Stem O. Corms large globular depressed. Extensively cultivated in Kashmir and a native of the south of Europe. The stigmas of flowers are used in fevers, melancholia and enlargement of the liver. It has also stomachic and stimulant properties. It is a good remedy for catarrhal affections of children. (K. and B.)

98. Croton Tiglium, *Linn.* The Purging Croton. N.O. Euphorbiaceæ.

Tam. Nervala virai. *Tel.* Nepala vittu.

Kan. Nepala bija.

A small evergreen tree, common in South India and Ceylon. Also found in Bengal and Assam. The seeds are officinal in both Indian and British Pharmocopœias. The seed is a drastic purgative. (Watt's Dy.)

99. Cucumis Melo, *Linn.* The Sweet Melon. N.O. Cucurbitaceæ.

Tam. Vellai virai. *Tel.* Mullampandu vittulu.

An annual herb, cultivated throughout India. The stems are prostrate and scabrous. The seeds are a cooling medicine. They are edible, nutritive and diuretic and used in painful discharge and suppression of urine.

100. Cucumis sativus, *Linn.* The Cucumber. N.O. Cucurbitaceæ.

Tam. Muhaveri virai. *Tel.* Dosa vittulu.
Hind. Khira. *Kan.* Sante kayi.

A climbing annual, hispid herbaceous plant and cultivated all over India. The seeds have a cooling property and used as diuretics. (K. and B.)

101. Cucurbita maxima, *Duchesne.* Melon pumpkin. N.O. Cucurbitaceæ.

Tam. Pushini virai. *Tel.* Gummadi vittulu.
Hind. Mitha kaddu. *Kan.* Kumble bija.

A large climbing hispid annual herb. The oil extracted from the seeds is a nervine tonic. (Watt's Dy.)

102. Cuminium cyminum, *Linn.* N.O. Umbelliferæ.

Tam. Siragam. *Tel.* Jilakara.
Kan. Jirige. *Hind.* Zira.

A slender annual herb. It is extensively cultivated in Rajputana and other parts of North India. The fruits are stomachic, carminative and astringent and useful in dyspepsia and diarrhœa. (K. and B.)

103. Curcuma amada, *Roxb.* Mango Zingiber. N.O. Scitamineæ.

Tel. Mamidi-allam. *Hind.* Am Haldi, Ama-haldi.

An annual, rootstock large ovoid. Tubers are cylindric deep, pale orange when mature. The rootstock is carminative and stomachic. It is also cooling. Useful as an external application for contusions and sprains. (K. and B.)

See fresh specimens in bottle in Hall I.

104. Curcuma aromatica, *Salisb.* Wild Turmeric. N.O. Scitamineæ.

Tam. Kasturi Manjal. *Tel.* Kasturi pasapu.
Kan. Kasturi arisana. *Mal.* Anakura.
Hind. Jangli Haldi, banhaldi.

A biennial herb, growing from the previous year's tubers. The tubers are yellow and aromatic inside. Collected in the forests of South India, especially in Travancore, Mysore, etc. The rhizomes are tonic and carminative. As an external application it is useful in sprains and bruises. (K. and B.)

105. Curcuma longa, *Linn.* Turmeric. N.O. Scitamineæ.

Hind. Haldi. *Tam.* Manjal.
Tel. Pasapu. *Kan.* Arisana.
Mal. Mannal.

An annual with large ovoid root stocks, the tubers are sessile and bright yellow inside. Widely cultivated throughout India. The rootstock is a stimulant in Indian medicine. More commonly used as an external application for bruises and sprains. (K. and B.)

106. Curcuma zedoaria, *Roscoe.* The Long and the Round Zedoary. N.O. Scitanimeæ.

Hind. Kachura. *Tam.* Kichchili Kizhangu.
Tel. Kachoram. *Kan.* Kachora.
Mal. Kacholam.

An annual with large rootstock and ovoid tubers. It is a native of Himalayas and cultivated throughout India. The rhizomes possess aromatic stimulant and carminative properties. They are also used in external applications in sprains and bruises. The fresh root is considered to be cooling and diuretic, it checks leucorrhœal and gonorrhœal discharges and purifies the blood. (K. and B.)

107. Cyperus rotundus, *Linn.* N.O. Cyperaceæ.

Hind. Musta, barikmoth. *Tam.* Korai Kizhangu.
Tel. Tunga muste, mustakamu. *Kan.* Koranari gadde.

A perennial herb flowering all the year. The rootstock is small tuberous and stoloniferous. A weed very common all throughout India. The roots are used as a diaphoretic and astringent and also used in dysentery. (K. and B.)

108. Dæmia extensa, *Br.* N.O. Asclepiadeæ.

Hind. Utran, Jutuk. *Tam.* and *Mal.* Veli parooththi ilai.
Tel. Jittupakku, gurti-chettu. *Kan.* Kemtiga, Talavaranaballi.

A perennial herbaceous twiner, common throughout India. A decoction of the leaves is given as an anthelmintic to children. Also used as an emetic for children. (K. and B.)

109. Dalbergia lanceolaria, *Linn.* N.O. Leguminosæ.

Hind. Takoli, bithna. *Tam.* Nal valanga pattai.
Tel. Errapachchari patta.

A large erect deciduous tree. Beautiful when it is in flowers. It is common all over the plains in Deccan. The bark and oil obtained from the seeds are medicinally used by the natives. (Beddome.)

110. Datura fastuosa, *Linn*, var alba. N.O. Solanaceæ.

Hind. Safēd dhaturā, Sadah dhaturá. *Tam.* Umattai.
Tel. Ummatta.
Kan. Umetta gida. *Mal.* Ummatta.

An annual herb and a weed, common all over India in waste places. The seeds and leaves are narcotic, anodyne and antispasmodic. An alkaloid daturine is prepared from the seeds and it is a substitute for Belladonna. (K. and B.)

See fresh specimen preserved in bottle Hall, I.

111. Dendrocalamus strictus, *Nees.* The Male Bamboo. N.O. Gramineæ.

Hind. Bans, Bans Kaban. *Tam.* Moongil uppu.
Tel. Vedura uppu.

Arborescent unawned bamboos with densely branching rootstocks. Common throughout India. The tabashir, or the silicious matter found near the joints is officinal and used as a cooling, tonic and astringent medicine

112. Dodonea viscosa, *Linn.* N.O. Sapindaceæ.

Hind. Aliar. *Tam.* Virali ilai.
Tel. Bandedu aku. *Kan.* Bandurgi ele.

A gregarious evergreen shrub, common throughout India. The leaves are externally used in burns and scalds. Also used in Punjab as an antidote for snakebite. (K. and B.)

113. Echinoderma Fossilised. N.O. Echinoidea.

The spines are used by Indian physicians in the treatment of dysentery.

114. Eclipta alba, *Hassk.* N.O. Compositæ.

Tam. Karsalang Kanni. *Tel.* Galagara.
Kan. Garagada.

A common weed found throughout India. A hirsute erect or diffuse annual. The plant is anodyne and absorbent and is a good remedy for headache. It is a tonic and used in hepatic and spleenic enlargements. (K. and B.)

115. Ehretia buxifolia, *Roxb.* N.O. Borragineæ.

Tam. Kuruvingi ver. *Tel.* Bapan boori veru.

A shrub with stiff branches; common in dry jungles in the Deccan peninsula. The root is employed by the Hindu doctors as an alterative and by the Muhammadan as an antidote to vegetable poison. (K. and B.)

116. Elephantopsus scaber, *Linn.* The Prickly-leaved Elephant's Foot. N.O. Compositæ.

Hind. Gobhi. *Tam.* Anaishovadi.
Tel. Yenugabira.

Throughout India. A rigid perennial herb, dichotomously branched and 1—2 feet high. A decoction of the root and leaves is given on the Malabar coast in cases of dysuria; also used as an internal medicine for swellings or pains in the stomach. (K. and B.)

117. Elettaria Cardamomum, *Maton.* Lesser Cardamom. N.O. Scitamineæ.

Hind. Choti elachi, ilayechi. *Tam.* Elakkai.
Tel. Elakayalu. *Kan.* Yalakkikayi.

Malabar; on the Western Ghats from Coorg southwards. A perennial herb with a horizontal thick rootstock. The seeds are aromatic and used as an ingredient in compound preparations. (K. and B.)

118. Embelia Ribes, *Burm.* N.O. Myrsineæ.

Hind. Baberang, Wawrung.

Tam. and *Tel.* Vayuvilangam. *Kan.* Vayuvilanga.

Common throughout India, especially in the lower hills. Large scandent shrub. The fruits and seeds are highly valuable for their anthelmintic, alterative and tonic properties (K. and B.)

119. Enicostema littorale, *Blume.* N.O. Gentianaceæ.

Hind. Chota Kirayata. *Tam.* Vellarugoo.

Tel. Nelaguli.

Common throughout India especially near the coast. A perennial herb. The plant is used as a tonic and laxative. (K. and B.)

120. Entada scandens, *Benth.* N.O. Leguminosæ.

Tam. Samudrapuliyam Virai. *Mal.* Parinkaka Vully.

Malabar and Ramnad. A very large woody climber. The kernel is used as a febrifuge and emetic. (Drury.) Also used by Indian women for some days after delivery for allaying the bodily pains. (Dr. Watt.)

121. Eriodendron anfractuosum, *D.C.* The White Silk Cotton tree. N.O. Malvaceæ.

Hind. Safed Simal, Senibal.

Tam. Ilavan mottu. *Tel.* Boorugamoggulu.

Common in forests throughout the hotter parts of India. A middle-sized deciduous tree. The unripe fruits are demulcent and astringent. (K. and B.)

122. Eugenia Jambolana, *Lam.* Black Plum. N.O. Myrtaceæ.

Hind. Jaman. *Tam.* Naval naga.

Tel. Neradu, nairuri. *Kan.* Neral.

Common throughout the plains of India. A large evergreen tree which is much branched. The bark is astringent and is used alone or in combination with other medicines of its class in the preparation of astringent decoctions, gargles and washes. The fruit parts are also astringent and used in diarrhœa. They also make a good gargle for sore throat. (K. and B.)

123. Eulophia campestris, *Wall.* The Salep. N.O. Orchideæ.

Hind. Salib-misri.

Plains of India. A hypogeal herbaceous plant. The roots are tuberous. From the tubers Salep is obtained. This is useful as a tonic and aphrodisiac. (K. and B.)

124. Evolvulus alsinoides, *Linn.* N.O. Convolvulaceæ.

Tam and *Kan.* Vishnukranti. *Tel.* Vishnukrantam.

Mal. Krishnakranti.

A small prostrate plant, perennial, herbaceous and much branched; common all throughout India on the plains. The plant is used as a febrifuge with cumin and milk. Also believed to be a good remedy for dysentery. (K. and B.)

125. Exacum bicolor, *Roxb.* Country Kariyat. N.O. Gentianaceæ.

A common erect herb in the Deccan peninsula, found especially a Malabar and Nilgiris. The plant possesses tonic and stomachi properties. (Drury.) (K. and B).

126. Feronia elephantum, *Correa.* N.O. Rutaceæ.

Tam. Vilangkai. *Tel.* Velaga pandu.
Kan. Belatha hannu.

A large tree, common throughout India in dry situations. The frui is aromatic and used as a stomachic and stimulant in diseases o children. The ripe fruit is very good for throat affections anc the unripe for dysentery and diarrhœa when mixed with othe medicines. (K. and B.)

127. Ficus asperrima, *Roxb.* N.O. Urticaceæ.

Tam. Irumbamthan. *Tel.* Tarasu patte.
Kan. Khargas.

Deccan peninsula. A shrub or tree. The bark is used in hepatic and spleenic enlargements. (K. and B.)

128. Ficus bengalensis, *Linn.* N.O. Urticaceæ.

Hind. bor, ber, bargad. *Tam.* Alam.
Tel. Marree. *Kan.* Ahlada.
Mal. Peralam.

Planted in all the plains of India. A large tree sending down aerial roots from its branches. An infusion of the bark is believed to be a powerful tonic and is considered to have specific properties in the treatment of diabetes. (K. and B.)

129. Ficus hispida, *Linn.* N.O. Urticaceæ.

Hind. Kagsha, gobla totimla. *Tam.* Peyattipattai.
Tel. Bodamamidi. *Kan.* Adavee attipatte.

Common throughout India. The plant is a tree with opposite leaves, quick growth and hispid nature. The bark is used for its emetic properties (K. and B.)

130. Ficus retusa, *Linn.* N.O. Urticaceæ.

Hind. Kamrup, Zir. *Tel.* Yerra juvi patta.
Kan. Pilala patte.

Common in the Deccan peninsula. A large ever-green, umbrageous tree often epiphytic with slender aerial roots. The root bark when boiled in oil forms a good application for wounds and bruises. (K. and B.)

131. Flacourtia Ramontchi, *L'Herit.* N.O. Bixineæ.

Hind. Bilangra, bhamber kanju, handi. *Tel.* Kanregu.

Southern India and Ceylon. The plant is a deciduous tree. The fruits are given in jaundice and spleenic enlargements. The seeds are ground with turmeric and applied over the body to prevent rheumatic pains from exposure to damp winds, in the cases of women after child birth. (K. and B.)

132. Gardenia gummifera, *Linn.* N.O. Rubiaceæ.

Hind. Dekamali, Kamarri. *Tel.* Chitamatta, gaggaru.
Kan. Chitta, Kambia.

A common tree in South India. The gum obtained from this plant is used internally in dyspepsia accompanied by flatulence (K. and B.)

133. Geniosporum prostratum, *Benth.* N.O. Labiatæ.

Tam. Nilatulasi. *Tel.* Nelatulasi.

An annual prostrate herb, common in dry sandy plains in the Deccan peninsula. The plant is regarded as a febrifuge at Pondicherry. (K. and B.)

134. Gisekia phranaceoides, *Linn.* N.O. Ficoideæ.

Tam. Manali Kirai. *Tel.* Esukadanti Kura.

A much diffuse branched herb, common in South Deccan. The plant is used for its anthelmintic properties in cases of tænia. (K. and B.)

135. Gloriosa superba, *Linn.* N.O. Liliaceæ.

Hind. Kariāri, Karihāri, Lānguli, Kulhāri.
Tam. Kalaipaikizhangu. *Tel.* Agni Shika.

Throughout tropical India. A herbaceous tall branching climber. Used in Madras in cases of snake and scorpion bites. Also mentioned by Sanskrit writers to be useful in midwifery. (Watt's Dy.)

136. Gmelina asiatica, *Linn.* N.O. Verbenaceæ.

Tam. Nilak-Kumizh. *Tel.* Challagummudu.
Hind. Badhara.

Common in the Deccan peninsula. A large straggling shrub with bright yellow flowers. The root and leaves are used in gonorrhœa and catarrhal afflictions of the bladder. (Dr. Watt.)

137. Guizotia abyssinica, *Cass.* Niger Seeds. N.O. Compositæ.

Tel. Valesulu Viththulu. *Kan.* Huchchellu.
Hind. Ramtil, Kalatil.

Cultivated in many parts of India. A stout erect annual. An oil is extracted from the seeds and this is a substitute for seasamum oil in medicine. (K. and B.)

138. Gymnema sylvestre, *Br.* N.O. Asclepiadeæ.

Tam. Shiru, Kurunja. *Tel.* Poda patra.
Hind. Gurmar.

This is common on Travancore side. A stout woody climber, covering high trees. The root is believed to be an antidote, internal, and external for snake bites. It is also supposed to have emetic and expectorant properties. (K. and B.)

139. Helicteres Isora, *Linn.* The East Indian Screw Tree. N.O. Sterculiaceæ.

Tam. Valumbirikai. *Tel.* Syamali Kaya.
Kan. Kavargi Kai. *Hind.* Kapasi, Marosi.

Common in dry forests of Western India and a shrub. The fruits are made into liniment for sores of the ear. (K. and B.)

140. Heliotropium indicum, *Linn.* N.O. Boragineæ.

Tam. Telkodukkuchedi. *Tel.* Telu-munnie.
Mal. Tel-Kotukka. *Hind.* Hatta-jurie, Hattasura.

Throughout India, especially in the moister parts, such as tank shores, lake shores, canal and field bunds. A hispid annual herbaceous plant. The leaves are used as an external application to ulcers, wounds and local inflammations. They have been found useful also in sore throats. (K. and B.)

141. Hemidesmus indicus, *Br.* N.O. Asclepiadeæ.

Eng. Indian Sarasaparilla. *Tam.* Nannari.
Tel. Sugandhipala. *Kan.* Sugandha paladagida.

Hind. Magrabu, Janglichanbelli.

All over India. These are twining shrubs. The root is officinal in Indian Pharmacopœia. The root is sweet, demulcent, alterative diaphoretic, duiretic and tonic. Useful in loss of appetite, fever, skin diseases, etc. (K. and B.)

142. Hibiscus esculentus, *Linn.* The Edible Hibiscus. N.O. Malvaceæ.

Tam. Venda Kai. *Tel.* Benda Kaya.
Kan. Bende Kai. *Hind.* Bhindi Ram turai.

Cultivated all over India. A tall herb with rough hairs. The fruit is officinal in Indian Pharmacopœia. The immature capsules are used to make a decoction which is used in catarrhal affections, ardor urine, gonorrhœa, etc. (K. and B.)

143. Holarrhena antidysenterica, *Wall.* Kurchi or Connersi Bark Tree. N.O. Apocynaceæ.

Tel. Amkudu vittulu. *Tam.* Kasappu Veppalai Virai.
Kan. Beppala bija. *Hind.* Kureya, Kaureya, Karra, Kaura.

Common in the dry forests of South India. A small deciduous tree. The seeds possess carminative and astringent properties and are used in chronic chest affections such as asthma. They have also tonic and aphrodisiac properties. (K. and B.)

144. Hydnocarpus Wightiana, *Blume.* N.O. Flacourtiaceæ.

Tam. Niradi muttu. *Tel.* Niradi Vittulu.

Mal. Morotti.

Common in Malabar along the coast. A tall tree. The seeds are used in some skin diseases, ophthalmia and as a dressing for wounds and ulcers. (K. and B.)

145. Hydrocotyle asiatica, *Linn.* The Boileau plant or Asiatic pennywort. N.O. Umbelliferæ.

Tam. Vallara. *Tel.* Bokkudu.
Kan. Vondelaga. *Hind.* Brahma manduki, Khula khudi.

A common weed all over India. A prostrate perennial herb. The leaves are officinal in the Indian Pharmocopœia. They are alterative tonic and local stimulant. They are very useful in the treatment of syphilis. (K. and B.)

146. Hygrophila spinosa, T. *Anders.* N.O. Acanthaceæ.

Tam. Nirmalli. *Tel.* Nirguri.
Kan. Kalavanka. *Hind.* Talmakhana.

Common and abundant in ditches all over India. An annual marshy herb. The leaves and roots are cooling and tonic. They are used in jaundice, rheumatism, dropsy, gonorrhœa, etc. (K. and B.)

147. Hymenodictyon excelsum, *Wall.* N.O. Rubiaceæ.

Tam. Sigapputvilari pattai. *Tel.* Dudiyetta patta.
Kan. Bandaray anui patta. *Hind.* Bhaulan Bhalena.

Common in dry hills throughout South India and Ceylon. A large deciduous tree. The bark is bitter and astringent and is used as a febrifuge. (K. and B.)

148. Indigofera aspalathoides, *Vahl.* N.O. Leguminosæ.

Tam. Shivanar Vembu. *Kan.* Shiva-malli.

Plains of Carnatic. A low undershrub with a number of spreading woody branches. The plant has cooling and demulcent properties and used in leprosy, cancerous affections, etc. (K. and B.).

149. Ionidium suffruticosum, *Ging.* N.O. Violaceæ.

Hind. Ratanpuras. *Tam.* Orilaithamarai.
Tel. Purusharatnam or Suryakanti.

Very common in open lands all over India. A perennial herb. The leaves and stalks are demulcent and used in decoction and electuary. The roots are used in bowei complaints of children. (K. and B.)

150. Ipomæa biloba, *Forsk.* N.O. Convolvulaceæ.

Hind. Dopati-latā. *Tam.* Musal kattu kirai.
Tel. Balabanditige aku.

An extensively creeping and twining seashore plant. Very common throughout India on the beach. The leaves are used as an external application for rheumatism and colic. (K. and B.)

151. Ipomæa Turpethum, *Br.* Indian Jalap or Turpeth root. N.O. Convolvulaceæ.

Tam. Shivadi. *Tel.* Tellatagadu.
Hind. Pitohari, Nisoth. *Kan.* Bilitigadu.

Common throughout India and a large climbing herb. The root is a substitute for jalap and therefore a very good purgative. (K. and B.)

152. Jatropha curcas, *Linn.* N.O. Euphorbiaceæ.

Tam. and *Mal.* Kattamanakku Virai.
Tel. Adavianida Vittulu. *Hind.* Bagberenda.
Kan. Maraharaloo bija.

Very common near villages, cultivated and naturalized throughout India. An evergreen shrub. An oil is obtained from the seeds and this is used as a purgative. (K. and B.)

153. Jatropha glandulifera, *Roxb.* N.O. Euphorbiaceæ.

Tam. Addalai virai. *Tel.* Nela amida vittulu.
Hind. Undarbibi jangli erandi.

Common in the Deccan peninsula. An evergreen shrub. The oil from the seeds is very good, as an external application for rheumatism and paralysis. Possesses also purgative properties. (K. and B.)

154. Justicia Gendarussa, *Linn. f.* N.O. Acanthaceæ.

Tam. Karunochchi ilai. *Tel.* Nallanocchi or Nela vavilli aku.
Kan. Karelakki ele. *Mal.* Karinochchi ela.
Hind. Nili-nargandi.

Common throughout India. A perennial much branched under-shrub. The leaves are used as a febrifuge. They also possess emetic properties. It is also used in chronic rheumatism.

155. Lagenaria vulgaris, *Seringe.* N.O. Cucurbitaceæ.

Tam. Sorakkai virai. *Tel.* Sorakaya vittulu.
Hind. Kaddu lanki.

Cultivated throughout India. A large pubescent climbing annual. The seeds yield an oil which is used as an application for head-ache. (Watt's Dy.)

156. Lepidium sativum, *Linn.* The cress. N.O. Cruciferæ.

Tam. Alivirai. *Tel.* Adit yalu.
Kan. Alibija. *Hind.* Chansaur.

Cultivated throughout India. An annual erect herb. The seeds are tonic and alterative, also believed to have aphrodisiac and diuretic properties. The seeds are a good substitute for mustard. (K. and B.)

157. Leucas aspera, *Spreng.* N.O. Labiatæ.

Tam. Thumbai chedi. *Tel.* Tumma chettu.
Kan. Thumba gida. *Hind.* Chota-pal-kusa.

Plains of India, often in regular formations. A diffuse annual. According to Dr. J. C. Shortt the juice of the leaves is applied successfully in psoriasis and other chronic skin eruptions. The flowers warmed in honey is given to children to cure colds and coughs. (Watt's Dy.)

158. Linum usitatissimum, *Linn.* The Flax or Linseed plant. N.O. Lineæ.

Tam. Alee virai. *Tel.* Atasi vittulu.
Kan. Alshi bija. *Hind.* Alsi, tisi.

Cultivated throughout India. An annual herb. Linseed poultice is good for gouty and rheumatic swellings. Officinal in both the Indian and English Pharmocopœias. (K. and B.)

159. Lippia nodiflora, *Rich.* N.O. Verbenaceæ.

Tam. Podutalai. *Tel.* Bokenaku.
Hind. Bhin-okra.

Abundant in wet places throughout India. A creeping annual herb with heads of flowers. The plant is officinal and considered cooling. The tender stalks and leaves are bitter and prescribed in the form of an infusion to children suffering from indigestion and to women after delivery. (K. and B.)

160. Luffa acutangula, *Roxb.* Var Amara. N.O. Cucurbitaceæ.

Tam. Pey peerkan kai. *Tel.* Adavi beerakaya.
Hind. Turai.

Common in North India. These are extensively climbing hairy annuals. The seeds possess purgative and emetic properties. (K. and B.)

161. Mallotus philippinensis, *Muell.* The Monkey Face Tree. N.O. Euphorbiaceæ.

Tam. Kapila or Kamala maram. *Tel.* Kapila chettu.
Kan. Kunkuma, Kamela. *Hind.* Kambilā kamud, Kamelā.

Common all over Tropical India. A small evergreen tree with buttressed trunk. The powder which covers the leaves, capsules and the bark is used as an anthelmintic and vermifuge. From the seeds a medicinal oil is prepared. (K. and B.)

162. Melia azadirachta. *Linn.* The Nim or Margosa tree. N.O. Meliaceæ.

Tam. Veppa maram. *Tel.* Vepa chettu.
Kan. Bevina. *Hind.* Nim, bāl-nīmb, ninb.

A common tree, throughout India. Every part of the plant except the wood is used in medicine, namely, the bark, rootbark, young fruit, nuts, oil, flowers, leaves, gum and toddy. A very valuable tree in that every part of it is very useful in medicine. The rootbark, bark and young fruit are tonic and antiperiodic. The oil, bark, nuts and leaves are local stimulant, insecticide and antiseptic. The flowers are stimulant, tonic and stomachic. The gum is a demulcent tonic and the toddy is an alterative tonic. They are all useful in many diseases. (K. and B.)

163. Mimusops elengi, *Linn.* N.O. Sapotaceæ.

Tam. Maghizampoo. *Tel.* Pogada poovalu.
Kan. Bokala hoovu. *Mal.* Elengi poo.
Hind. Molsari.

Common in South India. It is a small tree. The flowers are used with other astringents to prepare a lotion for sores and wounds. The flowers are also used as a stimulant medicine. The bark and seeds are also used in medicine. (Watt's Dy.)

164. Mimusops hexandra, *Roxb.* N.O. Sapotaceæ.

Tam. Palai pattai. *Hind.* Khirni.

Common in Deccan. A gregarious, evergreen tree or shrub. The bark is valuable for its astringent tonic properties and used in fevers. (K. and B.)

165. Mollugo Cerviana, *Seringe.* N.O. Ficoideæ.

Tam. Parpadagam. *Tel.* Parpatakamu.

A common plant all over the hot parts of India. An annual marshy plant. The plant is used in fevers. (Watt's Dy.)

166. Moringa pterygosperma, *Gærtn.* The Horse Radish tree. N.O. Moringaceæ.

Tam. Murunga virai. *Tel.* Murunga vittulu.
Kan Nugge bija. *Mal.* Muruna vittu.
Hind. Shajuah, Segva.

Rootbark. Tam. Murunga ver pattai, ; *Tel.* Murunga veru patta ; *Kan.* Murunga beru patte, ; *Mal.* Murunga veru tolu, ;

Cultivated all over India. A tree. The seed is said to be stimulant and is given in the treatment of the enlargement of liver and spleen The rootbark is used in inflammation, abscess, etc. A decoction of it is some times given as a fomentation to relieve spasm. (K. and B.)

167. Mukia scabrella, *Arn.* N.O. Cucurbitaceæ.

Tam. Musumusukai. *Tel.* Kutarubudam.
Hind Bilari, agumaki.

Perennial herbs. Common throughout India. The tender shoots are used as a gentle aperient and recommended in vertigo and biliousness. (Watt's Dy.)

168. Murraya Kœnigii, *Spreng.* The Curry leaf tree. N.O. Rutaceæ.

Tam. Karuveppilai.
Tel. Karepaku. *Kan.* Karibevusoppu.
Hind. Harrikatnim.

Cultivated all over India. A short evergreen tree. The plant is officinal in the Indian Pharmacopœia for its tonic and stomachic properties. The raw leaves are eaten for dysentery. An infusion of the toasted leaves is used to stop vomiting. Externally they are used to cure bruises. (K. and B.)

169. Myristica fragrans, *Houtt.* The Nutmeg, Mace. N.O. Myristiceæ *Aril—Tam., Tel.* and *Kan.* Japathri.
Hind. Japatr.
Seed—Tam. and *Mal.* Jadikai. *Tel.* Jaji Kayulu.
Kan. Jaji kayee. *Hind.* Jayphal.

A native of the Moluccas and cultivated in South India. It is a handsome bushy evergreen tree. The nutmeg is a very valuable

article much used in English and Indian medicine. It is regarded as a stimulant, carminative and in large doses narcotic. Useful in bowel complaints, general debility, asthma, cholera, etc. Considered also as aphrodisiac. (Watt's Dy.)

170. Nardostachys Jatamansi, *D.C.* Spikenard. N.O. Valerianeæ.

Tam. Jatamashi. *Tel.* Jatamamshi.
Kan. Jetamavashi. *Hind.* Balchar.

Wild in the Himalayas. A perennial herb. The roots of this plant are bitter and aromatic. They have tonic, stimulant and antispasmodic properties and used in the treatment of epilepsy, hysteria and convulsive affections. (Watt's Dy.)

171. Nelumbium speciosum. *Willd.* The Sacred Lotus. N.O. Nympheaceæ.

Tel. Damara. *Tam.* Tamarai.
Kan. Tavare. *Hind.* Kanwal.

Throughout India in still waters. It is an erect large herb which is extensively creeping. The root is used in dysentery and dyspepsia. The seeds form a cooling medicine for cutaneous disease and leprosy and are also believed to be an antidote for poisons. (K. and B.)

172. Nigella sativa, *Linn.* Black Cummin. N.O. Ranunculaceæ.

Tam. Karum Shiragam. *Tel.* Nalla Jilakara.
Kan. Kari jirige. *Hind.* Kalonji, Kalongi, Kalajira.

A native of South Europe; extensively cultivated in many parts of India. The seeds are aromatic, carminative, stomachic and digestive and are used in fevers, diarrhœa, loss of appetite, etc. (Watt's Dy.)

173. Nymphæa lotus, *Linn.* N.O. Nympheaceæ.

Tam. Ambal, Alli tamarai. *Tel.* Yerrakaluva, Alli tamara.
Kan. Nyadale-huvu. *Hind.* Kanval.

Common throughout India especially in the warmer parts in still waters. An extensively creeping erect herb. The powdered root is prescribed as a demulcent for piles and it is also used in dysentery and diarrhœa. The seeds are a cooling medicine for cutaneous diseases and leprosy. (K. and B.)

174. Ocimum Basilicum, *Linn.* The Common Sweet Basil. N.O. Labiatæ.

Tam. Tirunooththu pachchai. *Tel.* Veeboothi pachchai.
Kan. Kamkasturi. *Hind.* Sabzah.

Small herbaceous plants, common throughout tropical and hotter India and also cultivated. The juice of the leaves of this plant form a good cure for ringworm and for scorpion stings. The seeds are cooling and given in infusion in gonorrhœa, diarrhœa and dysentery. (K. and B.)

175. Ocimum canum, *Sims.* N.O. Labiatæ

Tam. Naithulasi. *Tel.* Kukkatulasi.
Kan. Nayitulasi, Ramatulasi.

Common in plains and low hills of India. Erect herbaceous plants. During fever when the extremities are cold, the leaves are made into a paste and applied to the finger and the nails. (K. and B.)

176. Ocimum sanctum, *Linn.* The Sacred Basil. N.O. Labiatæ.

Tam. Tel. and *Kan.* Tulasi. *Hind.* Kāla-tulsi.

Common all over the hotter parts of India. It is a strong smelling perennial erect herb. The leaves have expectorant properties and their juice is used in Indian medicine in catarrh and bronchitis. An infusion of the leaves is used as a stomachic in the gastric disorders of children and in hepatic complaints. The seeds are muscilaginous and demulcent and used in the disorders of the genito-urinary system. (K. and B.)

177. Odina Wodier, *Roxb.* N.O. Anacardiaceæ.

Tam. Uthayam pattai. *Tel.* Dumpini patta.
Kan. Shimli patte. *Hind.* Jingan, Kashmala.

Common throughout the hotter parts of India. A large deciduous tree. The bark is officinal in the Indian Pharmacopæia. It is astringent and considered to be very good as a lotion in obstinate ulcers. (K. and B.)

178. Papaver somniferum, *Linn.* The Opium Poppy. N.O. Papaveraceæ.

Tam. and *Tel.* Posthakai. *Hind.* Post.

Cultivated throughout India. An annual herbaceous plant. The opium drug is officinal in the British Pharmocopœia and its use as a narcotic and medicine is well known. Used in a number of diseases. The seeds are considered to be very cooling. (Watt's Dy.)

179. Pavetta indica, *Linn.* N.O. Rubiaceæ.

Tam. Pavattam ver. *Tel.* Papata beru.
Hind. Kankra.

A large shrub. The root is bitter found throughout India, and possesses aperient qualities. Commonly prescribed by Indian doctors in visceral obstructions. Given in powder to children. (K. and B.)

180. Pedalium Murex, *Linn.* N.O. Pedalineæ.

Tam. Anai nerinji. *Hind.* Farid-būti, bara gokhru.
Kan. Yenugapalleru.

Common in Deccan. An annual herb growing in sandy places near the sea—common in Madras beach near Adyar. The fruits are possessed of antispasmodic and aphrodisiac properties. The fruits are employed as medicine in England for spermatorrhœa, impotence, etc. Decoction of the root is antibilious. (K. and B.)

181. Peucedanum graveolens, *Benth.* The Dill or Sowa. N.O. Umbelliferæ.

Tam. Sata kuppi. *Tel.* Sompa.
Hind. Sowa, soya.

Common throughout tropical and sub-tropical India. A perennial glabrous herb. The fruit is carminative, diuretic and emmenagogue. An infusion of it is given as a cordial drink to women after confinement. (K. and B.)

182. **Picrorhiza Kurrooa,** *Benth.* N.O. Scrophularineæ.

Tam. Katuku rogani. *Tel.* and *Kan.* Katuka rogani.
Hind. Katki.

A native of Northern India. A low hairy herb. The root is bitter and acrid and stomachic. Used in fever and in dyspepsia. Also used as an ingredient in many purgative combinations. (K. and B.)

183. **Pimpinella anisum,** *Linn.* The Anise. N.O. Umbelliferæ.

Tam. Sonbu. *Tel.* and *Kan.* Sonpu.
Hind. Saurif, saonf. *Mal.* Perin jirakam.

A native of Egypt and cultivated in a few parts in India (Orissa). An annual erect herb. The fruits possess carminative and digestive properties and are officinal in the Indian Pharmocopæia. (Watt's Dy.)

184. **Piper Cubeba,** *Linn.f.* N.O. Piperaceæ.

Tam. Val milagu. *Hind.* Kabatchini, valmilagu.
Tel. Chalava miryalu. *Kan.* Gunda menasu.
Mal. Val molagu.

A native of Java, and cultivated in India. The fruit has carminative and aphrodisiac properties and is extensively used in Indian medicine. (Watt's Dy.)

185. **Piper longum,** *Linn.* The Long Pepper. N.O. Piperaceæ.

Tam. Thippili. *Tel.* Pippili.
Hind. Pipul. *Kan.* Hippali.

Hotter parts of India, Travancore and North Malabar. Herbaceous climber. Like black pepper the fruit has stimulant carminative properties *but more powerful*. Useful in liver and spleen enlargements. It is also aphrodisiacal. (K. and B.)

186. **Piper nigrum,** *Linn.* N.O. Piperaceæ.

Tam. Vellai milagu. *Hind.* Mirch, kalimirch.
Tel. Tella miryalu. *Kan.* Bili menasu.

A native in the forests of Malabar and cultivated in hot damp parts of India. It is a stout climber. The seeds are carminative, digestive tonic and very useful in intermittent fevers, dyspepsia, flatulence, etc.

187. **Pistacia integerrima,** *Stewart.* Pistachio Gallo. N.O. Anacardiaceæ.

Tam. Kakkata shingi. *Tel.* Kakara-shingi.
Hind. Kakra. *Kan.* Dushtapa chattu.
Sansk. Karkata sringi.

Northern India. A middle-sized deciduous tree. The gall is used as an expectorant and therefore in coughs, asthma fever, want of appetite, irritability of the stomach, etc. (K. and B.)

188. Pistia Stratiotes, *Linn.* The Wester Lettuce. N.O. Aroideæ.

Tam. Agasatamari. *Tel.* Agasatamara.
Hind. Jalkumbi.

Throughout India in still sweet water, common in all tanks and small lakes which are used for drinking. A floating stemless herbaceous plant. The plant is cooling and demulcent and is given in dysentery. Mixed with rice and coconut they are given in dysentery. With sugar and rose water it is given in asthma. The plant is also able to kill bugs. (K. and B.)

189. Plumbago zeylanica, *Linn.* N.O. Plumbagineæ.

Tam. and *Tel.* Chitramoolam. *Hind.* Chitra, chitarak.
Kan. Chitramoola.

Cultivated and wild throughout India. An evergreen perennial herb or undershrub. The root increases the power of digestion, promotes appetite and is useful in dyspepsia, piles, skin diseases, etc. Useful also in rheumatism. It causes also abortion. (K. and B.)

190. Psoralea corylifolia, *Linn.* N.O. Leguminosæ.

Tam. Karbogarasi. *Tel.* Karbogi vittulu.
Hind. Buckchi.

Common in the plains all over India. An erect annual undershrub of 1—3 feet. The seeds are believed to be a laxative, stimulant and aphrodisiac. They are also used for skin diseases and leprosy in the form of an external application. (K. and B.)

191. Pterocarpus santalinus, *Linn. f.* The Red Sandalwood. N.O. Leguminosæ.

Tam. Segappu santhanakattai. *Tel.* Yerra gandapu chikka.
Hind. Ragatchandan, undum. *Kan.* Kempu ganda chekke.

A smooth tree. Common in Cuddapah, Kurnool and North Arcot districts. It is considered as a hot remedy useful in bilious affections and skin diseases; used also in fevers and boils. Applied to the forehead in headache. (K. and B.)

192. Punica granatum, *Linn.* N.O. Lythraceæ.

Tam. Mathalampazha tholu. *Hind.* Anar, dasam, damu.
Tel. Mathalam pandu. *Kan.* Dâlimba.
Mal. Madala.

Cultivated throughout India. A large shrub or a small tree. The juice of the fruits is used as a cooling ingredient in some medicines prepared for dyspepsia. The rind of the fruit and the flowers combined with aromatics such as cloves, cinnamon, coriander, pepper are used as a bowel astringent in diarrhœa. The pulp is cardiac and stomachic. The root bark and the rind are officinal in the Indian Pharmacopæia. The root is not of much value in medicine. (K. and B.)

193. Quercus infectoria, *Oliver.* N.O. Fagaceæ.

Tam. and *Tel.* Masikkai. *Hind.* Majuphul, mazul.

A middle-sized tree, and native of Greece only imported in India. The galls are officinal in the Pharmacopœia of India, for their astringent, tonic and antiperiodic properties. They are used in diarrhœa, dysentery, intermittent fever, etc. (Watt's Dy.)

194. Randia dumetorum, *Lamk.* N.O. Rubiaceæ.

Tam. Marakkalam patta. *Tel.* Mangapatta.
Hind. Mainphal, manyul.

Common in Deccan in small hills in very dry places. A deciduous thorny shrub with axillary spines. The bark is astringent and used in fever. The bark is given internally and is also applied externally when the bones ache in fever. (K. and B.)

195. Ricinus communis, *Linn.* The Castor Oil Plant. N.O. Euphorbiaceæ.

Tam. Amanakku mutthu. *Tel.* Amadala vittulu.
Hind. Arand, Erand. *Kan.* Haralu bija.
Mal. Avanakku virai.

Common all over tropical India and extensively cultivated for its seeds. A small shrub. The oil is one of the best purgatives which acts without heat or irritation. Its usefulness in diarrhœa in the case of children and in dysentery in the case of all, are very well known.

196. Ruta graveolens, *Linn.* Var Angustifolia. N.O. Rutaceæ.

Tam. Arvadan chedi. *Tel.* Sadapa.
Hind. Sudab, pismarum. *Kan.* Nagadali soppu.

A temperate plant, cultivated in India. It is a herb. The dried leaves powdered and in combination with other aromatics are used in dyspepsia. The fresh leaves are used in the treatment of paralysis. The herb and the oil act as stimulants chiefly of the uterine and nervous systems. (Watt's Dy.)

197. Salix tetrasperma, *Roxb.* N.O. Salicineæ.

Tam. Attupalai pattai. *Tel.* Yetipala patta.
Hind. Bed, bent, baishi. *Kan.* Niranji patta.

Throughout tropical and sub-tropical India. A moderate-sized deciduous tree. The bark is used as a febrifuge. (K. and B.)

198. Sapindus trifoliatus, *Linn.* N.O. Sapindaceæ.

Tam. Ponan-kottai. *Tel.* Kugiti kayalu.
Hind. Rithe.

A large tree, very common about the villages in South India. The fruit is hot, dry, and tonic. Externally it is applied on abscesses. Also used externally to cure the bites of scorpions, centipedes, etc. Also used as an expectorant and as an anthelmintic. (Watt's Dy.)

199. Saussurea Lappa, *C. B. Clarke.* N.O. Compositæ.

Tam. and *Tel.* Koshtum. *Hind.* Kut, Kust.

They are tall, very stout herbs found in Kashmir. The root is known as Kust. It is pungent, aromatic, tonic and aphrodisiac. Used in asthma, cough, fever, dyspepsia and skin diseases. (K. and B.)

200. Scindaspus officinalis, *Schott.* N.O. Aroideæ.

Tam. and *Mal.* Atti tippili. *Tel.* Gajapippili.
Hind. Gajapipal, Hati-pipli. *Kan.* Doddahippali.

A forest plant of the tropical Himalayas. A fleshy climbing perennial shrub. The fruit is stimulant, diaphoretic and anthelmintic. Also said to be aromatic and carminative. (K. and B.)

201. Semecarpus anacardium. *Linn.* Marking Nut. N.O. Anacardiaceæ.

Tam. Sherangkottai. *Tel.* Jeedi vittalu.
Hind. Bhilawa, Bheyla. *Kan.* Geru bija.

A common handsome tree in all the portions of tropical India. The ripe fruits are regarded as acrid, heating, stimulant, digestive, nervine and are used in dyspepsia, piles, skin diseases and nervous debility. (K. and B.)

202. Sesamum indicum, *Dec.* The Gingelly Seeds. N.O. Pedalineæ.

Tam. and *Kan.* Ellu. *Tel.* Noovulu.
Hind. Krishna til.

An extensively cultivated annual crop. The plant is a herb. The seeds are said to be emollient, nourishing, tonic, diuretic and lactogogue. The oil is a good substitute for food and medical purposes. They are very useful in ulcers, rheumatism, etc. The seeds are useful in bleeding piles and constipation. (K. and B.)

203. Sesbania ægyptiaca, *Pers.* N.O. Leguminosæ.

Tam. Karum chembai ilai. *Tel.* Sominta aku.
Hind. Jet rasin.

A weedy tree like herb common throughout India. The leaves are applied in the form of a poultice to hydrocele and rheumatic swellings. Also promotes absorption of boils and abscesses. The juice of the fresh leaves is given as an anthelmintic. (K. and B.)

204. Sesbania grandiflora, *Pers.* N.O. Leguminosæ.

Tam. Agaththi ilai. *Tel.* Avasi aku.
Hind. Basna. *Kan.* Agasa ela.

A very common cultivated tree throughout India especially in gardens where betel leaves are grown. The leaves and flowers are useful in nasal catarrh and headache. The juice is blown up the nostrils and causes a copious discharge of fluid relieving the pain and sense of weight in the head. (K. and B.)

205. Shorea Talura, *Roxb.* N.O. Dipterocarpeæ.

Tam. Talarai. *Tel.* Jalari.
Kan. Jalada.

A common tree in the Coromandel Coast and Mysore. The resin is a medicine used by the Indians.

206. Sida spinosa, *Linn.* N.O. Malvaceæ.

Tam. Mayirmanikkam. *Tel.* Mailumanikyam.
Hind. Jangli-methi.

Common all over Deccan and other hot parts of India. The leaves are demulcent and refrigerant and are used in some cases of gonorrhœa, gleet and scalding urine. The root acts as a gentle tonic and diaphoretic and is employed in mild cases of debility and fever. (K. and B.)

207. Smilax china, *Linn.* China Root. N.O. Liliaceæ.

Tam. Parangi chekkai. *Tel.* Parangi chekka.
Hind. Chob-chini. *Kan.* Parangi chekka.

A native of China and not known in India. The root is officinal in the Indian and Chinese Pharmacopœias. A valuable medicine in syphilis, rheumatism, etc., and it is also an aphrodisiac. (Watt's Dy.)

208. Solanum indicum, *Linn.* N.O. Solanaceæ.

Tam. Mulli Kai. *Tel.* Tella Mulakayulu.
Hind. Barhanta.

Very common throughout tropical India. An erect undershrub. The smoke of the burning fruit is considered a remedy for tooth-ache. The root is used as an ingredient in Hindu medicines with other drugs. The root is used in cases of cough and catarrhal affections. (Watt's Dy.)

209. Solanum trilcbatum, *Linn.* N.O. Solanaceæ.

Tam. Thoothoovalai. *Tel.* Mulla mushte.

Common in dry waste places all over South India. A prickly undershrub. The roots and leaves are bitter and prescribed in consumptive cases in the form of an electuary, decoction and powder. (K. and B.)

210. Solanum xanthocarpum, *Schrad & Wendl.* N.O. Solanaceæ.

Tam. Kandangkathrikai. *Tel.* Ponnemulakakaya.
Hind. Katila, Katai.

Very common throughout India in waste and dry places. A prickly diffuse herb. The fruit is said to possess like the root, expectorant properties and is used in asthma, cough, chest pain. Mixed with other expectorants and given in the form of a decoction or electuary. The root has expectorant qualities. The stem has carminative properties. (Watt's Dy.)

211. Strychnos nux-vomica, *Linn.* The Nux-vomica or Strychnine Tree. N.O. Loganiaceæ.

Tam. Etti kottai. *Tel.* Mushti vittulu.
Hind. Kuchla. *Kan.* Mushti bija.

Throughout tropical India and common in the Madras Presidency. A large deciduous tree. The seeds are used as a medicine for dyspepsia and diseases of the nervous system. They are also useful as a stimulant in small quantities. Taken also in habitual constipation, chronic dysentery, etc. (K. and B.)

212. Strychnos potatorum, *Linn. f.* N.O. Loganiaceæ.

Tam. Tetan kottai. *Tel.* Chillginjalu.
Hind. Nirmali ver. *Kan.* Chell-bija.

A tree common in Deccan. The seeds are used in clearing muddy water. The seeds are also used as a local application in eye diseases. The seeds are used in diabetes, and gonorrhœa. (K. and B.)

213. Tamarindus indica, *Linn.* N.O. Leguminosæ.

Tam. Puliyamaram. *Tel.* Chinta-chettu.
Hind. Amli, ambli, nuli. *Kan.* Hunasemara.

All over the hot part of India. Very common all over the Madras Presidency. A large evergreen tree. The ripe fruit is regarded refrigerant, digestive, carminative and laxative and useful in diseases such as burning of the body, costiveness, etc. The leaves are applied as poultice to inflammatory swellings. The pulp of the fruit is considered to be cardiacal, astringent and aperient. The seeds are astringent. They are used as poultice to boils. (K. and B.)

214. Terminalia Catappa, *Linn.* Indian Almond. N.O. Combretaceæ.

Tam. Nattu vathumaikai. *Tel.* Vadam kayalu.
Hind. Jangli badam. *Kan.* Tari Kayee.

Extensively cultivated in India. A tall deciduous tree. The fruit is officinal in the Indian Pharmacopœia. The oil extracted from the seeds is a substitute for almond oil. The bark is said to be astringent. (K. and B.)

215. Terminalia Chebula, *Retz.* The Myrobolan. N.O. Combretaceæ.

Tam. Kadukkai. *Tel.* Karakkaya.
Hind. Hara, har. *Kan.* Alale kayi.
Mal. Katukke.

More common in Northern India. Less common in Deccan. A large deciduous tree. The fruits are laxative, stomachic, tonic and alterative. They are used in fevers, coughs, urinary diseases, vomiting, etc. Water in which the fruits are kept for the night is considered a very cooling wash for the eyes. (K. and B.)

216. Terminalia tomentosa, *Bedd.* N.O. Combretaceæ.

Tam. Karumaruthai pattai. *Tel.* Maddi patte.
Hind. Asan. *Kan.* Matti, Kari matti.
Mal. Thembavu.

Very common in Deccan. A large deciduous tree. A decoction of the bark is taken internally in atonic diarrhœa and locally as an application to weak indolent ulcers. (K. and B.)

217. Tinospora cordifolia. *Miers.* N.O. Menispermaceæ.

Tam. Seenthil or poonool kodi. *Tel.* Tippatige.
Hin. Gurach Gurcha, Gulancha. *Kan.* Amrita balli.
Mal. Amrutavalli.

A glabrous, succulent, climbing shrub, common in the Carnatic. The powder of the stem is used in making an infusion. Used as an alterative and tonic. The starch obtained from the roots and stems of this plant is as good a food as arrow root and this starch is useful in chronic dysentery. (K. and B.)

218. Toddalia aculeata, *Pers.* N.O. Rutaceæ.

Tam. Milagarani veru. *Tel.* Konda kachinda veru.
Hind. Karij.

A large scandent shrub, common all over India, from sea level up to 6,000 feet in bushy places. The root is pungent and aromatic and is considered as stomachic and tonic and this is officinal in the Indian Pharmacopœia. The root bark is also useful as an ante-periodic, nearly as good as cinchona. The fruits are rubbed down with oil to make a stimulant liniment for rheumatism. (K. and B.)

219. Trianthema decandra, *Linn.* N.O. Ficoideæ.

Tam. Vellaisarani veru. *Tel.* Tella galijeru veru.
Kan. Gaija beru.

A diffuse prostrate branched herb. Deccan peninsula. The root is aperient, and is used in asthma and suppression of the menses. (K. and B.)

220. Tribulus terrestris, *Linn.* N.O. Zygophylleæ.

Tam. Nerinjee kai. *Tel.* Palleru kayalu.
Hind. Gokshri, hussak. *Kan.* Negalu kayee.
Mal. Nerinjil kai.

All over the plains in India. A very common weed in the open grass lands. A prostrate annual or perennial. The fruit is very valuable as an aphrodisiac, cooling, diuretic, and tonic. Used in importence, urinary disorders, calculous affections, etc. (K. and B.)

221. Trichosanthes palmata, *Roxb.* N.O. Cucurbitaceæ.

Tam. Savooripazham. *Tel.* Kaki-donda.
Hind. Lāl-indrayan, indrayan, makal. *Kan.* Avagude-hannu.

A common plant, distributed all over India. They are perennial herbs. The fruit pounded and well mixed with warm coconut oil forms a valuable application to sores under the ears and nostrils. With the juice of the fruit and gingelly oil, an oil is made which is useful for bathing for persons suffering from frequent headaches. (K. and B.)

See fresh specimen in bottle in Hall I.

222. Trigonella Fænumgræcum, *Linn.* The Fenugreek. N.O. Leguminosæ.

Tam. and *Mal.* Vendayam. *Tel.* Menthayalu.
Hind. Melthi, Muthi. *Kan.* Menthya.

An extensively cultivated crop in South India. It is wild in Kashmir and the Punjab. It is an annual erect herb. The seeds are carminative, tonic and aphrodisiac. Several confections made with this article are recommended for use in dyspepsia with loss of appetite. (K. and B.) The seeds soaked in water for the night and taken with curd forms a good remedy for dysentery.

223. Tylophora asthmatica, *W. & A.* N.O. Asclepiadeæ.

Tam. Nanjarappan ilai. *Tel.* Verripala aku.
Hind. Antamul. *Mal.* Vallipala ilai.

A perennial herb, common in the Deccan peninsula. The dried leaves are emetic, diaphoretic and expectorant; useful in over loaded stomach and other cases requiring the use of emetics. It is a

good substitute for Ipecacuanha. Also used in dysentery. The root is a substitute for Ipecacuanha, but the leaves are certainly a better substitute for this medicine. (K. and B.)

224. Ventilago madraspatana, *Gærtn.* N.O. Rhamneæ.

Tam. Vembadam or surul pattai. *Tel.* Surati chekka.
Hind. Pitti. *Kan.* Pupli chekke.

Common throughout the plains of India. A large much branched woody climber. The powdered root bark is considered to be carminative, stomachic, tonic and stimulant. Used in atonic dyspepsia, debility and slight cases of fever. (K. and B.)

225. Vernonia anthelmintica, *Willd.* The Purple Flea Bane. N.O. Compositæ.

Tam. Kattu seeragam. *Tel.* Adavi jilakara.
Hind. Bukchi. *Kan.* Kadijirige.

A tall strong annual, common throughout India. The seeds are used in combination with other ingredients as an anthelmintic. The seeds are also considered tonic and stomachic. (K. and B.)

226. Vitex Negundo, *Linn.* N.O. Verbenaceæ.

Tam. Nochchi ilai. *Tel.* Vairla akulu.
Hind. Nirgandi. *Kan.* Lakki ele.

A very common plant in South India, especially near villages. The leaves are aromatic, tonic and vermifuge. A pillow stuffed with the leaves is placed under the head for relief of headache. (K. and B.)

227. Vitis quadrangularis, *Wall.* The Edible Stemmed Vine. N.O. Ampelideæ.

Tam. and *Mal.* Pirandai. *Tel.* Nalleru.
Hind. Harshankar Harjora. *Kan.* Mangaruli.

A common plant all over the hot part of India. A herbaceous plant with its stem four-sided. The powdered stem and leaves are given by some Indian practitioners of Madras for bowel affections connected with indigestion. The stem beaten into a paste is given for asthma. (K. and B.)

228. Zingiber officinale, *Zosc.* Dry ginger. N.O. Scitamineæ.

Tam. Shukku. *Tel.* Sonti.
Hind. Sonth, sindhi. *Kan.* Shunti.
Mal. Chukka.

Cultivated throughout India, especially South Malabar (Calicut). The ginger is officinal in both British and Indian pharmacopœias. A stimulant and helps digestion. Used in toothaches, gout, indigestion and pulmonary and catarrhal affections. (Watt's Dy.) The fresh ginger is used in pickling.

See fresh specimen in bottle in Hall I.

DRUGS (FORMALIN COLLECTION).

1. **Asparagus sarmentosus,** *Willd.* N.O. Liliaceæ. See p. 42.

2. **Averrhoa Carambola,** *Linn.* N.O. Geraniaceæ. See p. 42.

3. **Citrus medica,** *Linn.* Var. medica proper. N.O. Rutaceæ.

Hind. Bejausa. *Tam.* Narattam pazham.
Tel. Naradabba. *Kan.* Nimbe hanu.
Mal. Ganapathi naranna.

A shrub wild in Western Ghats and cultivated in many places in South India especially in the Trichinopoly district. The fruit is highly valuable for its medicinal properties. The rind is hot and dry. The pulp is cold and dry. The fruit is large, oblong or obovoid, rind usually warted, thick, tender and aromatic. The fruit is often used for pickles also.

4. **Citrullus colocynthis,** *Schrad.* Colcynth. N.O. Cucurbitaceæ.

Hind. Indrāyān makāl. *Tam.* Peyt-tumatti, Verit-tumatti.
Tel. Chitti papāra etipuchcha, papāra būdama. *Kan.* Tumti kaye, pava makke kayi.
Mal Peycommuttie.

Plant is distributed throughout India, cultivated and also very often apparently wild. A climbing herb, hispid or scabrous with tendrils two to three fid. The fruit is smooth and variegated, green and white in colour. The seeds are small. The fruit is used in medicine for a great many diseases such as asthma, dropsy, constipation, etc. (Watt's Dy.)

5. **Corallocarpus epigæa,** *Hook. f.* N.O. Cucurbitaceæ. See under Medicinal Drugs, article 91, page 50.

6. **Cucumis sativus,** *Linn.* N.O. Cucurbitaceæ. See Medicinal Drugs, article 100, page 52. Also used as a vegetable.

7. **Curcuma amada,** *Roxb.* N.O. Scitamineæ. See Medicinal Drugs, article 103, page 52.

8. **Curcuma aromatica,** *Salisb.* See under Medicinal Drugs, article 104, page 52.

9. **Datura fastuosa,** *Linn.* N.O. Solanaceæ. See under Medicinal Drugs, article 110, page 53.

10. **Garcinia mangostana,** *Linn.* The Mangosteen. N.O. Guttiferæ.

Hind. Mangūstān.

A native of Malayan Peninsula. Cultivated in a few places in the Madras Presidency such as the hot valleys of the Nilgiris, and Palni hills. The specimen is from Courtallum, Tinnevelly district. The plant is a small conical tree of 20 to 30 feet. The branches are many. The fruit is a berry which is as large as an orange, smooth, dark purple; pericarp firm spongy. The seeds are large and flattened with white fleshy arils. The fruit is esteemed as a valuable drug in Indian medicine. The dried rind or entire fruit is

employed as a remedy for diarrhœa, dysentery, and affections of the genito-urinary organs. The fruit is highly esteemed both by Europeans and Indians and is considered to be the most palatable of fruits. The fruit comes into season in May and June. (Watt's Dy.)

11. Gloriosa superba, *Linn.* N.O. Liliaceæ. See p. 57.

12. Iphigenia indica, *Kunth.* N.O. Liliaceæ.

Distributed throughout India and on hills up to 4,000 to 5,000 feet. The cover is globose ½ inch in diameter. Neck 1 inch to 2 inches. Sheaths brown. Both wild and cultivated in many places in India both in the plains and on the hills up to 7,000 feet. Believed by the Indian physicians that the root is a gentle aperient. But it has been since then proved that its purgative properties are very feeble. What is sold in the bazaar as jalap is now known to be obtained from an Ipomæa. (Watt's Dy.)

13. Mirabilis jalapa, *Linn.* Marvel of Peru. N.O. Nyctagineæ.

Hind. Gullabbās, gula-bāsh. *Tam.* Pattarāshu.
Tel. Bhadrākshi, Chandra-malli, Chandrakanta. *Kan.* Chandra-mallige, Sanya mallige.

A large herbaceous plant grown in gardens throughout India and often found as an escape. It flowers between August and December. The flowers are Ipomœa like and crimson, yellow or white. (Cooke's Bombay Flora.) The tuberous root was once supposed to be the jalap of the shops but that has long since known to be produced by an Ipomoea. Mentioned that the Spanish ladies employed the powdered root mixed with rice flour and sandal wood oil as a cosmetic. (Watt's Dy.)

14. Samadera indica, *Gærtn.* N.O. Simarubeæ.

Tam. Niepa. *Mal.* Karinghota.

A tree, 30 to 35 feet high, common in South India and Ceylon; usually on the coast in salt or brackish water channels. This tree is the source of the Neipa bark of commerce. Every part of the plant, the wood, bark, seed, root and leaf is used in Indian medicine. (Watt's Dy.)

15. Trichosanthes palmata, *Roxb.* N.O. Cucurbitaceæ. See Medicinal Drugs, article 221, page 71.

16. Urginea indica, *Kunth.* Indian Squill. N.O. Liliaceæ.

Hind. Kāndā, Jangli-piyāz, Kānde. *Tam.* Nari-Vengayam.
Tel. Nakka Vulli-gadda. *Kan.* Adari isulli.

Mal. Kāttulli.

A common plant in sandy soil on the Coromandel Coast and on hills up to 6,000 feet. A bulbous scapigerous herb. The bulb is of the size of an apple bitter and nauseous. Employed in medicine for various diseases such as asthma, dropsy, rheumatism, skin diseases, etc. (Dr. Watt's Dy.)

17. Zingiber officinale, *Zose.* N.O. Scitamineæ. See p. 72.

BEVERAGES.

1. **Camellia thea**, *Linn.* Tea N.O. Ternstrœmiaceæ.

China, Assam, Wynaad, Anamalais and the Nilgiris. A tree growing to a height of 10 or 12 feet in China and 30 to 40 feet in Assam. But for tea cultivation it is not allowed to grow so tall. In Southern India, it is grown in the hilly tracts of Wynaad, Anamalais and specially the Nilgiris. In Nilgiris, the estates are located at elevations varying from 5,000 to 7,000 feet above sea level. The climate here is enjoyable and at this height the place is free from any fever. The tea plant requires a subtropical to temperate climate. The temperature that suits it best is from 75° to 85° F. It requires a uniform rainfall and a good, porous, clayey soil. Tea grows well only in a properly drained soil. It has been found that soil greatly influences the flavour of the tea. In tea cultivations all sorts of manures, such as cattle dung, artificial manures, and green manures are used. Tea is easily grown by means of seeds, and for this purpose, some plants are set apart and allowed to grow into trees and set seeds. What is sold in the market as tea is the leaf of this plant. The plant is grown under a proper system of pruning and the leaves are gathered at certain times of the year, usually in October and February. They are afterwards taken to the factory and subjected to other processes and then they are brought out as the commercial tea. In the manufacture of black tea, the fermentation process is allowed to take place. While in the manufacture of green tea, fermentation is avoided. The oolong tea seems to be produced by a special of the plant and the process of manufacture too is slightly different in its case from the others. The Nilgiris, as has been already said, suits the conditions for the growth of tea very well and the eastern slopes especially where the rainfall is slightest yield the finest flavoured leaf. The samples are arranged in the show case according to the kinds of tea. The grades are merely commercial terms. The Orange Pekoe is supposed to be made up of buds. The next in descent is called the Pekoe and the one lower to this as 'Souchong' and so on. There is a corresponding class for the fine particles of each grade which generally gives a stronger tea than the grade itself and is hence higher in price.

I. Finest flowery Pekoe—
(1), (2), (3) Glendale Estate.

II. Orange Pekoe—
(4) Hoveton Gardens Estate.

III. Broken Pekoe—
(5) Avenue Estate.
(6) Curzon Estate.

IV. Pekoe—
(7) Kodanad Estate.

V. Pekoe Souchong—
(8), (9) Liddlesdale Estate.

VI. Souchong—
(10), (11), (12), (13) Avenue estate.

VII. Congou—
(14), (15) Glendale estate.

VIII. Young Hysson—
(16) Kodanad estate.

IX. Hysson—
(17) Kodanad estate.

X. Green Tea—
(18) Avenue estate.

XI. Gunpowder—
(19) Hoveton Garden estate.

XII. (20) Oolong tea.

XIII. (21) Assam tea.

XIV. (22) Nilgiris tea.

XV (23) Tea from Perindotty estate.

XVI. (24) Scented caper tea.

XVII. (25) Singapore tea.

2. Coffea arabica, *Linn.* Coffee. N.O. Rubiaceæ.

Supposed to be indigenous to Arabia or to Abyssinia. Extensively cultivated in the Madras Presidency, in Mysore, Coorg, the Wynad, the Nilgiris, Pulney and Shevaroy hills. The most important districts are Kadur and Hassan, both in Mysore, Coorg and the Madras Presidency proper. The coffee plant is a shrub and it grows at an elevation of 1,500 to 5,000 feet. In coffee cultivation, situation and exposure are factors of great importance. It requires a temperature ranging from 55° to 80° F. Coffee requires a humid climate and a rainfall ranging from 100 to 150 inches. The best coffee is obtained from plants grown on a ferruginous loamy soil which is well drained. The scion is planted to a good stock Arabian or Liberian and cultivated with scientific methods of pruning, manuring, digging and mulching.

Arabian coffee requires shade and for this purpose tall trees are used in Mysore while in Shevaroys the planters grow thick leafy bushes.

Terms employed in the market.

The ripe coffee fruit is called the " Cherry " and the enclosed twin seeds are called the " Berries " when only one seed is developed it is known as " Peaberry ". " Peaberry " has more flavour and is therefore sold for a high price. The succulent outer coat of the fruit is the " Pulp " and the inner adhesive coat is known as the " Parchment." The pulp is removed by machines and by washing and the seeds are sent with parchment to Europe, for the further process of hulling and cleaning which require expensive machinery.

The following are the samples of coffee obtained from the different places where it is grown in the Madras Presidency :—

(1), (2) Peaberry in parchment—Wynaad.
(3), (4) Peaberry cleaned—Coorg.
(5), (6) Seeds in parchment—Coorg.
(7), (8) (9), (10), (11), (12) Seeds cleaned—Coorg.

(13), (14) Seeds in parchment.—Wynaad.
(15), (16) Seeds cleaned.—Wynaad.
(17) Seeds in parchment.—Anamalais.
(18) Seeds cleaned.—Anamalais.
(19), (20) Seeds cleaned.—Anamalais.

(Book consulted—Dr. Watt's Commercial Products of India.)

CEREALS.

1. **Sorghum vulgare,** *Pers.* The Great Millet. N.O. Gramineæ.

Tam. Cholam. *Tel.* Jonnalu.
Hind. Jondla, Janera, Jundri. *Kan.* Jolah.

A tall handsome grass, cultivated throughout India. In the Madras Presidency, the districts in which this crop is chiefly grown are Guntūr, Nellore, Kurnool, Bellary, Anantapur and Cuddapah in the northern half of the Presidency, wherein about 3½ million acres of this crop are found and Coimbatore, Trichinopoly, Madura and Tinnevelly in the south where the area cultivated with sorghum is about 1·2 million acres. Next to paddy this is the widely cultivated cereal in the Presidency. A full account of Sorghum in Madras has been written by C. Benson, Deputy Director of Agriculture, and C. K. Subba Rao, Sub-Assistant Director of Agriculture (Dept. Ag. Mad. Bull., 1906, No. 55, 58 et seq.). According to these authors the outturn varies within circle limits. "The Punasa or early crops of sorghum give a larger outturn of comparatively poor fodder but less grain than the hingari or late crop. The outturn of unirrigated sorghum varies from 200 to 600 lb. per acre. Under irrigation the outturn on the average is double that amount. The outturn of dry straw from an unirrigated crop on fairly good land is two full cartloads per acre."

"The chief characteristic of the climate of the principal areas in the Madras Presidency where sorghum is an important field crop is the lightness of the rainfall. The only exception is that part of Nellore and Guntūr adjoining, where the annual rainfall is 30—40 inches. Elsewhere the usual fall is less than 25 inches and in some places as little as 20 inches only. There are two main seasons for sowing, an early at the beginning and a late towards the end of the South-west monsoon. The early sown crops are raised chiefly on the lighter soils. On the mixed and more loamy soils the middle season varieties are usually found and the late sown crops on the heavy soils." The crop is regarded as an exhaustive one and its growth year after year, on the same land is considered bad practice, but is not uncommon. It is stated that "speaking generally, on loamy or sandy soils sorghum, following castor or horsegram, is looked upon as the best rotation, while the ryots will not grow sorghum if they can avoid it after a crop of Italian millet or varagu. The commonest practice is to sow sorghum mixed with other crops which vary according to the nature of the soil, the season and the local customs. In the Deccan districts green gram and other pulses, gingelly and gogu (Hibiscus cannabinus) are mixed in small and irregular quantities with the sorghum seed for an early crop and sown through the drill while red gram, anumulu (Dolichos lablab),' cow gram (Vigna catjang), and castors are sown in lines amongst the crop.

In the southern districts, somewhat similar mixtures are made and the whole is sown broadcast, while it is a common practice to sow the red gram in lines at intervals of about six feet apart in the furrow made by the plough.

The following varieties are exhibited :—

1. **Sorghum vulgare,** *Roxb.* The Indian Millet. N.O. Gramineæ.

Tam. Cholam. *Tel.* Jonnalu.

Kan. Jolah.

This is from the Government Agricultural Farm at Kovilpatti in Tinnevelly. The varieties to which this belongs are put together under one descriptive head Irungu.

The following varieties are shown :—

1. White or fawn coloured glumed varieties.
2. Red or purple glumed varieties.
3. Black glumed varieties.

The Irungu is distinguished by the fact that the glumes hold the grain firmly by their inarched tips and allow a little of the ripe grain to be seen. Panicle is loose and the grain is broadest $\frac{1}{3}$ from apex.

2, 3, 4, 5, 6, 7, 8, 9. Grains of sorghum grown at Kovilpatti. There are three varieties shown, namely, the White, Red and Black.

10. **Sorghum vulgare,** *Pers.*

Tam. Thalaivirichan sholam.

This is from North Arcot. This belongs to the Botanical variety Hians. The grain here is overtopped by the glumes, but made evident by the glumes gaping at maturity so that it stands free. Panicle is distinctly loose.

11. The same as 10.

The specimen is from Gōdāvari.

12, 13. **Sorghum vulgare,** *Pers.*

Tam. Cholam. *Tel.* Tellajonnalu.

Kan. Jolah.

This is the white sorghum. This belongs to the sub-variety Fusces-cens of the division Mediœris. The grain here exceeds the glumes. The exhibits are from Madura. This kind is more commonly grown in the black cotton soil areas of Bellary, Anantapur and Kurnool.

14. Same as 12 and 13.

The exhibit is from the Government Agricultural Farm, Nandyal.

15. **Sorghum vulgare,** *Pers.*

Tel. Yerra Jonna.

The specimen is from the Government Agricultural Farm at Nandyal. This is red sorghum. It is sown on red loams in May and June. It matures in three months, grows to five or six feet. The straw is sweet and makes fairly good fodder. The grain is very wholesome and suitable for invalids. It contains less bran than Paccha Jonna.

16. **Sorghum vulgare**, *Pers.*

Tel. Cheruku Paccha Jonna.

The exhibit is from the Agricultural Farm, Nandyal. This is the yellow sorghum sown in October. It yields good fodder. This belongs to the sub-variety Luteus of the division Mediœris. The grain is longer than the glumes.

17. **Sorghum vulgare**, *Pers.*

Tel. Kagi Jonna.

The exhibit is from the Government Agricultural Farm, Nandyal. The white grain is enclosed in black glumes. It is sown about June on loamy soils. It yields good fodder.

18. **Sorghum yulgare**, *Pers.*

Tel. Venna Mutha Jonna.

This is a variety of the Great Millet from the Government Agricultural Farm, Nandyal.

19. **Sorghum yulgare**, *Pers.*

Tel. Venka Jonna.

This is a variety of the Great Millet from the Government Agricultural Farm, Nandyal.

2. **Eleusine Coracana**, *Gærtn.* N.O. Gramineæ.

Tam. Kaywur or Keshvaragu. *Tel.* Ragulu.
Hind. Natchini, Nachani, Nagli, Mandua, Mamya. *Kan.* Ragi.

This semi-erect to decumbent native grass belongs to the tribe Cholrideæ. It is a fairly productive rainy weather crop for light soils. It may be grown almost on stones and gravel. It yields from 5 to 6 maunds of grain per acre on the hills, 12 to 14 maunds in the plains if carefully cultivated and weeded. It is the staple grain of the Mysore country. Sometimes it is there stored in pits and it keeps good for years. In the Madras Presidency, nearly about 4½ millions of acres are cultivated with ragi and the districts of greatest importance are Salem, Coimbatore, Cuddapah, North Arcot, South Arcot, Trichinopoly, Anantapur and Vizagapatam.

The crop ripens in four months. It is much used by the labouring classes. It is not a dainty food but very nutritious. There are four varieties and it is grown in both unirrigated and irrigated land, but most commonly in that commanded by a well. When dependent upon rainfall alone it is sown in May to June and from October to December to get the benefit of one or other of the monsoons. Under wells and tanks it is sown and reaped throughout the year. Only the ears of ragi are cut as they ripen. This is heaped for two or three months and the grain is beaten out with sticks or trodden under foot by cattle. It should be kept some months before being used.

Ragi is a crop that can be preserved for many years without fear of being attacked by insects or moulds and hence the value of this grain as a famine food is very great.

Ragi is also a paying crop. It can be grown on a soil on which nothing else could be grown. (Dr. Watt's Comm. Prods.)

The following varieties are exhibited. They are all from the Government Agricultural Farm, Palur, North Arcot :—

1. Transvaal Ragi.

Tam. Keshvaragu. *Tel.* Ragulu.

2. Mysore Ragi.

Tam. Keshvaragu. *Tel.* Ragulu.

3 and 4. Madras Ragi.

Tam. Keshvaragu. *Tel.* Ragulu.

5. Talaivirichan Ragi.

Tam. Keshvaragu. *Tel.* Ragulu.

6. Sixty days ragi.

This is ragi harvested in 60 days.

7. Rattai Ragi.

This is a variety grown in the Government Agricultural Farm, Palur.

Tam. Keshvaragu. *Tel.* Ragulu.

3. Panicum Crusgalli, *Linn.* **Var. frumentaceum,** *Trimen.* N.O. Gramineæ. The Samva Millet.

Hind. Samva.

Tam. Kudiraivali or Shamai. *Tel.* Bouth Shama.

The plant is a tufted annual extensively cultivated as a rainy-season crop over a large area in South India. The culms of this millet are erect, from 2 to 4 feet high ; the leaves are large and the panicle erect, oblong and rigid. It is composed of numerous incurved spikes. This is the quickest growing of all the millets, and in some localities can be harvested within six weeks of being sown. It thrives best on light sandy soils. It is sown in April and May and cut in June and July. It is sometimes sown in June and cut in August. It is eaten by the poorer classes. It is parched and eaten boiled in milk. In this Presidency the straw is much used as cattle fodder. (Dr. Watt's Comm. Prods.)

4. Paspalum scrobiculatum. *Linn.* The Kodo Millet. N.O. Gramineæ.

Hind. Kodo, Kodaka. *Tam.* Varagu.

Tel. Allu, Aruga, Pa tarige. *Kan.* Harik.

This is an erect grass growing to 2 feet in height. It is extensively cultivated during the rainy season, on the Ghat parts of the Deccan. It is largely grown in the Bombay Presidency. It grows readily on the poorest soils.

Sown after the rains and harvested in October. A large number of poor people consume it as food, but the grain cannot be considered a wholesome article of diet. (Dr. Watt's Comm. Prods.)

5. **Pennisetum typhoideum**, *Rich.* The Bulrush Cumboo or Spiked Millet. N.O. Gramineæ.

Tam. Kambu. *Tel.* Sajjalu, sazza.
Hind. Bajra, Bajri, bajera, lahra, Kasa-Jonar.
Kan. Sajje.

A tall erect grass, 5 to 6 feet high. The leaves are broad and long; the spikes are terminal, cylindric in form and 6 to 9 inches long. It is cultivated very widely in Madras and Mysore. The chief districts in Madras where this is extensively cultivated are in order of importance.—1. Coimbatore, 2. Salem, 3. Cuddapah, 4. South Arcot, 5. Guntūr, 6. Trichinopoly, 7. North Arcot, 8. Madura. In Coimbatore it is cultivated on dry lands, except black. It is often grown as a mixed crop with cotton, castor oil, pulses, etc. The land is ploughed in April after heavy rains. In July-August it is again ploughed, and the seed mixed with various pulses is sown broadcast. In November-December it is reaped by cutting off the ears as they ripen.

The grain is used by the poorer classes for food. The flour made into cakes or bread with buttermilk, is considered more nutritious than rice. The leaves and stems are used as fodder for cattle. (Dr. Watt's Comm. Prods.)

6. Same as 5.
Dry local Cumbu. From Koilpatti Government Agricultural Farm.

7. Same as 5 and 6.
Local irrigated Cumbu. Koilpatti Agricultural Farm.

8 & 9. Same as 5, 6 and 7.
Fried Cumbu or *Tam.* Poree

10. Same as 5.
Transvaal Cumboo. Long cobbled.
The specimen is from Palur Government Agricultural Farm.

11 & 12. **Setaria italica**, *Beauv.* The Italian Millet. N.O. Gramineæ.

Hind. Kangui, tangan, Kayuni, Kungu, Rawala.
Tam. Thenai. *Tel.* Korralu.
Kan. Sajja.

This annual grass has cylindrical panicle, at length nodding at the summit. This millet is extensively grown in South India on the plains and on the hills too. It is frequently grown as an intermediate crop; in some districts it is sown in April and May and cut in June and July; in others it is sown from June to September and reaped from September to January. This millet is generally regarded as nutritious and digestible. It is eaten in the form of cakes or of porridge. In our Presidency it is specially valued as a flour to be used in making pastry. When boiled with milk it constitutes a light and pleasant meal for invalids. It is also much valued as food for cage birds and poultry. The straw is used for bedding or for thatching houses. (Dr. Watt's Comm. Prods.)

13 & 14. Triticum vulgare, *Vill.* Wheat. N.O. Gramineæ.

Hind. Kunak, Giun. *Tam.* Godhumai.
Tel. Godhuma. *Kan.* Godhi.

Wheat is an annual grass of whose origin we are not certain. It belongs to the tribe Hordeæ of Gramineæ. There are a very large number of cultivated varieties of this plant, distinguished by the presence or absence of an awn, by the colour of the grain—"red" or "white"—by the hardness and translucency or by the softness and opacity of the Kernel, etc. Great improvements in the quality of the grain and its size and yield have been effected of later years in the Punjab by the exertions of its Agricultural Department.

Generally speaking wheat is grown in those parts of India where rice does not thrive. Nearly all the production is confined to the Punjab including the North-West Frontier Province, United Provinces, Central Provinces, Bombay and Bengal.

Wheat is an unimportant crop in the Madras Presidency. It is grown to a small extent in the Nilgiris, Kurnool, Bellary, Kistna, Guntūr, Cuddapah, Anantapur and Madura. In Mysore it is grown in Chitaldrug and Shimoga. It needs no saying that wheat is one of the most nutritious cereals. It is used as food by almost all the people in Punjab, United Provinces, Central Provinces and Bombay and by many people in South India. It is simply cooked as food or is converted into bread. The soft wheats produced in Northern India are adapted for milling purposes. The hard wheats of Southern India are adapted for the manufacture of Macaroni, Vermicelli, etc.

The hard red and white wheats are preferred for local consumption in India. The hard red wheat is chiefly grown in Bombay, United Provinces and Central Provinces. The hard white wheat is grown in Deccan.

15. Zea Mays, *Linn.* Maize or Indian Corn. N.O. Gramineæ.

Hind. Mukka-Bhuta, But, Makai, Janara.
Tam. Cholam. *Tel.* Zonalu.
Kan. Jola.

Tall annual grass. The cultivated races are very numerous and show great power of adaptation to local environment. It bears its grain in a solitary axillary female spike. The grain varies much in colour, form and size. This crop is cultivated over a large area in this Presidency and in Mysore. The largest acreages are in Guntūr, Cuddapah, Kurnool, Tanjore and Kistna. Maize is not a very important crop of South India. It is more widely cultivated in Northern India, Bombay and Sindh.

The chief uses of this cereal are as an article of human and cattle food. The stems and leaves are very much valued as fodder. In the Ceded Districts the flour is made into bread.

16. Same as 15. The exhibit is the fried grain of **Zea Mays.**

Tam. Makkachola poree.

7. **Oryza sativa**, *Linn.* N.O. Gramineæ.

The chief rice growing districts of this Presidency are Tanjore, Malabar, Kistna, South Arcot, South Kanara, Madura, Trichinopoly and Tinnevelly. The annual value of the paddy crop in Madras is over sixty crores of rupees. In most of these places the varieties grown and the methods of cultivation adopted are all old. The Agricultural Department of Madras is doing its utmost to improve the varieties and the methods of cultivation of this crop. To get a good idea of the work the department is doing, reference is to be made to the reports on the operations of the Department of Agriculture, Madras.

The following varieties of South Indian Paddy arranged in alphabetical order are exhibited.

. *Arunjothee.*
A race of rice in the Madras Presidency.

. *Biringi arisi.*
A race of rice in the Madras Presidency.

. *Chinna Semba.*
A race of rice in the North Arcot District. Ref., Cox & Stuart, District Manual, North Arcot, i, 1895, p. 260. A race of transplanted rice.

. *Gedda Varee.*
A race of rice in Madras.

. *Goondoo Semba.*
A race of rice which thrives well on farm soils. The grain is very good and commands popularity.

. *Iluppapoo Semba.*
One of the principal rices of this Presidency.

. *Iswara Kovai.*
One of the principal rices of this Presidency.

. *Kadai Kazhuththan.*
One of the principal rices of this Presidency.

. *Kadugu Semba.*
This is one of the principal rices of this Presidency.

. *Kaikkala Semba.*
One of the principal rices of this Presidency.

. *Kalikkan Semba.*
One of the principal rices in this Presidency.

. *Karumozanam.*
One of the principal rices in this Presidency.

. *Kodai Semba.*
A principal race of rice in this Presidency.

. *Madu Muzhungi.*
One of the principal rices in this Presidency.

15. *Manakkaththan.*
One of the principal rices in this Presidency.

16. *Manjal Poombalai.*
One of the principal rices in this Presidency.

17. *Molagu Semba.*
One of the principal rices in this Presidency. It has been tried at the Palur Agricultural Farm; it is found suitable for heavier soils of the district. The yield of this variety is very good. It gives a high percentage of rice to paddy, both by weight and measure. It is also about a fortnight earlier than other main crop varieties which is a distinct advantage in seasons of short rainfall.

18. *Muttakar.*
A race of rice in the North Arcot District.

19. *Muththu Semba.*
A race of rice in the Trichinopoly district. A six months' crop.

20. *Nellam Semba.*
One of the principal rices in this Presidency.

21. *Nellore Pïsanum.*
A race of rice in the Nellore District.

22. *Palan Semba.*
An important race of rice in this Presidency.

23. *Peroom Kar.*
One of the principal rices in this Presidency.

24. *Picchavari.*
A race of rice in the North Arcot District. Ref., District Manual, North Arcot, i, 1895, p. 260.

25. *Pisanam.*
A race of rice in the North Arcot District. Ref., District Manual, North Arcot, i, 1895, p. 260.

26. *Pisini or Kodai Semba.*
A race of rice in the Madras Presidency.

27. *Poom Semba.*
A race of rice in the Presidency.

28. *Pooththarisee*
A race of rice in the Presidency.

29. *Rāmanadhan Semba.*
A race of rice in Madras.

30. *Sadai Semba.*
A race of rice experimentally cultivated in the Central Farm, Coimbatore.

31. *Sadan Semba.*
A race of rice in the Presidency.

32. *Seeraga Semba.*
A race of white rice in the taluk of Chellumbrum, South Arcot. Sown in July, transplanted from August to October, and reaped from January to March.

33. *Seeralan Semba.*
One of the principal rices in this Presidency.

34. *Seevan Semba.*
One of the principal rices in this Presidency.

35. *Sembalai.*
A race of rice in the Trichinopoly district. A six months' crop.

36. *Sengkovai.*
One of the principal rices in the Presidency.

37. *Sigappu Goondu Semba.*
One of the principal rices in this Presidency.

38. *Sigappu Poombalai.*
One of the principal rices in this Presidency.

39. *Sigappu Sirumani.*
One of the principal rices in this Presidency.

40. *Sirumani.*
A race of rice obtained from Tanjore and Udamalpet and experimentally cultivated in the Central Farm, Coimbatore.

41. *Sugathas Karuppu.*
One of the principal rices in this Presidency.

42. *Thattan Semba.*
Also known as Suvarnavari. One of the principal rices in this Presidency. It has been tried at the Palur Agricultural Farm and found to come to harvest earlier than all other varieties grown along with it. Ref. Rep. on the work of the Agricultural Farm, Palur, 1915-16.

43. *Thavudarisi nellu.*
One of the principal rices in this Presidency.

44. *Thuthuvalai.*
One of the principal rices in this Presidency.

45. *Thooyamalli.*
One of the principal rices in this Presidency.

46. *Tiruvalam Semba.*
One of the principal rices in this Presidency.

47. *Vadai Semba.*
A race of rice in Madras which ripens in five months. Sown in August and reaped in December.

48. *Vellai Goondu Semba.*
A race of rice in Madras. *See* Goondu Semba.

49. *Vellai Iswara Kovai.*
One of the principal rices in this Presidency.

50. *Vellai Kadai Kazhuththan.*
One of the principal rices in this Presidency.

51. *Vellai Milagu Semba.*
One of the varieties of rices in this Presidency. It has been tried in the Palur Agricultural Farm and found to suit heavy soils.

52. *Vellai Muththu Semba.*
One of the principal rices in this Presidency.

53. *Vellai Poombalai.*
One of the principal rices in this Presidency. *See* Poombalai.

54. *Vellai Sirumani.*
A very popular and important race of rice in this Presidency. *See* Sirumani

55. *Verangumittan.*
One of the principal rices in this Presidency.
Books consulted—The Agricultural Ledger, 1910, No. 1, Oryza Sativa, Scientific Reports of the Madras Government Agricultural Farms.)

Varieties of Paddy from the Government Agricultural Farm, Palur, North Arcot.

1. **Oryza Sativa**, *Linn.* Banku paddy. N.O. Gramineæ.
In the Rep. Oper., Dept. of Agric., Madras Pres., 1903-04, p. 3, it is mentioned to have attracted some notice round the farm on account of (1) its tillering character which makes it possible to plant it thinly and save seed, and (2) its capability to mature rapidly. Rep., I.C., 1906–07, pp. 15, 48 and 49. Yield per acre given. Rep., Dept. of Agric., Madras, 1908–09, App. 1, p. 29. A race of rice experimentally cultivated in Central Farm, Coimbatore. Yield per acre given, Lousdale in Agric. Journ., India, iv, April 1909, p. 158. Mentioned as a race of fine quality. Experimented in the Sivagiri Farm, Tinnevelly district. Good quality.

2. *Chilakat Paddy.*
A race of rice cultivated in the Central Provinces. Reference may be made to Agricultural Ledger No. 5 of 1908–09, pp. 78, 92, 103 and 107. This is being experimentally cultivated at the Palur farm.

3. *Chinnore Paddy.*
A race of Bombay rice. (Ref., Rep., Oper., Dept. of Agric., Madras Presidency, 1906-07, p. 49. Yield per acre also given.)

4. *Chini Kapur Paddy.*
A race of Bengal rice, sown in May, transplanted in July and reaped in November. The exhibit is from the Agricultural Farm, Palur, where this has been experimentally cultivated.

5. *Coimbatore Chinna Semba Paddy.*

The chinna semba race seems to have originated in the North Arcot district. The exhibit is from the Agricultural Farm, Palur, of the chinna semba cultivated at Coimbatore. The method of cultivation of Chinna Semba at North Arcot is given in the District Manual of the district, I, 1895, p. 260.

6. *Kurimohar Paddy.*

A race of rice experimentally cultivated at Palur Agricultural Farm.

7. *Gurmatia Paddy.*

Another race of rice experimentally cultivated at the Palur Government Agricultural Farm.

8. *Parewa Paddy.*

A race of transplanted rice grown in the Central Provinces. An account of it is given in the Rep., Agric. Stations, in C.P., 1906–07 and 1908–09, pp. 8 and 37. The exhibit is from the Agricultural Farm, Palur, where this has been tried.

9. *Sambalpuri Paddy.*

A race of rice in Cuttack. This has been experimentally cultivated in the Agricultural Farm, Palur.

10. *Shanijira Paddy.*

A race of rice in Gaya. Also exhibited in the Bengal Economic Museum, Regr. C., No. 5192, 1876. This has been experimentally grown in the Agricultural Farm, Palur.

11. *Raskudam Paddy.*

A race of rice in Raipur, Central Provinces. This has been experimentally cultivated in the Palur Agricultural Farm.

12. *Rattan Chooree Paddy.*

A race of rice in Cuttack. This has been experimentally cultivated in Palur.

13. *Radhabalum Paddy.*

A race of first-class rice grown in the districts of the Central Provinces. Requires little water. Sown on bunded lands of inferior soil and reaped in the end of October. This has been experimentally cultivated in the Palur Agricultural Farm.

14. *Safeda Paddy.*

A race of second-class rice in Lahore, Punjab. (Ref. Baden-Powell, Punjab Products, 1, 1868, p. 234. This has been experimentally cultivated in the Palur Agricultural Farm. Book Consulted—The Agricultural Ledger, 1910, No. 1 (Oryza sativa).

SOUTH INDIAN PULSES.

1. Cajanus indicus, *Spreng.* Pigeon Pea. N.O. Leguminosæ.

Tam. Thovarai. *Tel.* Kandalu.
Kan. Thogeri. *Mal.* Tuvara.
Hind. Arhar, Thur, Dal, Burrietuvar, Arhuku, Shakul.

This belongs to the sub-tribe of the Cajaneæ the 5th under the tribe Phaseoleæ. There is but one species of Cajanus and that is not truly Indian but African. An erect shrub with slender branchlets. The pod is straight from 2 to 3 inches long and $\frac{1}{4}$ to $\frac{1}{2}$ inch broad, 3 to 5 seeded. Extensively cultivated all over South India. Sown in June or July and reaped from December to March. Commonly grown with cotton. Used as food to a very large extent by all classes of people in South India. (A. H. Church.)

2. Same as 1.

The seeds are shown split.

3. Cicer arietinum, *Linn.* The Chick Pea or Bengal Gram. N.O. Leguminosæ.

Tam. Kadalei. *Tel.* Harimandhakam.
Hind. Chola, Channa, Chana, Hurbari, Adas, Chela, Rohala.

This belongs to the tribe Vicieæ, and the sub-order Papilonaceæ. A viscose much branched annual with imparri-pinnate leaves. The plant attains to a height 2 feet or more. The pods are $\frac{3}{4}$ to 1 inch long and usually contain 2 seeds which are generally somewhat symmetrically crinkled. Grown in North Arcot, Coimbatore and Nilgiris. Sown in August or September and reaped in April and May. The ripe, unhusked seeds are largely used for horses and cattle as food. The seeds after parching, grinding or steeping or the removal of the husks, is used as food by Indians. (A. H. Church.)

4. Dolichos biflorus, *Linn.* The Horse Gram. N.O. Leguminosæ.

Tam. Kollu. *Tel.* Ulava.
Kan. Huruli. *Mal.* Muthera.
Hind. Kulthi, Kulti.

This species of Dolichos is either sub-erect or twining in habit. The pod is much recurved $1\frac{1}{2}$ to 2 inches in length, 5 to 6 seeded. Wild in the Himalayas. In South India a very important crop. Grown chiefly in Coimbatore, Salem, Trichinopoly, South Arcot, Bellary, Anantapur, Kurnool, Kistna and Mysore. It grows on the poorest soils and does not require much of irrigation or manure. The practice of cultivating it varies in the different districts of this Presidency. Generally sown from August to November and reaped from November to February. A very good cattle food. Boiled and given after it becomes cold. Very largely used as horse food. Given to them also in the same way. Used very largely by the poorer classes of South India as it is a cheap pulse. The plant is also grown in many places for green manure. They are also grown for fixing the nitrogen in the soil. (A. H. Church.)

5 & 6. Dolichos lablab, *Linn.* The Lablab-Bean. N.O Leguminosæ.

Tam. Motchai. *Tel.* Boberle.
Kan. Avare. *Hind.* Sim, Pertab-Singh.

This belongs to the sub-tribe Euphaseoleæ of the Phaseoleæ. A true native of India ascending to 6,000 feet in the Himalayas. An annual crop in cultivation and is cultivated all over South India. In the Madras Presidency, it is grown chiefly in Trichinopoly, Madura, Bellary, Cuddapah, Coimbatore, Tanjore and North Arcot. There are three kinds of this pulse, white, red and black. Sown from June to August and reaped from October to March. Also grown in Mysore. Used as a green vegetable and also as a fodder material. Its ripe seeds are used in culinary preparations. (A. H. Church.)

7 to 10. Same as 5 and 6.

The exhibits are from Madura.

11. Glycine Soja, *Benth.* The Soy-Bean. N.O. Leguminosæ.

Hind. Bhat, Bhatwan.

A sub-erect or creeping annual, native of China, Cochin-China, Japan and Java, comparatively recently introduced into India. At present more a garden than a field crop. In Madras Presidency it has hardly passed the experimental stage. The exhibit is from the Agricultural Farm, Trivandrum. Two varieties occur, one called white and the other black. Sown from June to September and harvested from November to December. Its chemical composition places it above other pulses as an albuminous food. Sometimes an oil is extracted from the seeds and the cake left forms a good manure. (A. H. Church.)

12. Lens esculenta, *Mœnch.* The Lentil. N.O. Leguminosæ.

Tam. Misurpurpur. *Tel.* Misur-pappu, chirisanagalu.
Hind. Masuri, Mussur.

This plant belongs to the tribe Vicieæ. A branched annual with oblong leaflets, usually 8 in number. The seeds are compressed, and have the form of a biconvex lens. In the Madras Presidency it was once cultivated to a good extent. The cultivation of this crop is now on the decrease. Sown in September and October and reaped in March and April. A very valuable pulse and is used as food. The young pod is used as vegetable and the dry leaves and stalks are greatly prized as fodder. (A. H. Church.)

13. Phaseolus aconitifolius, *Jacq.* The aconite leaved Kidney Bean. N.O. Leguminosæ.

Tam. Tulukapayaru. *Tel.* Kuncuma-pesalu.
Kan. Madki. *Hind.* Mut, Mote, Moth, Mothi, Bhringga, Meth-kalai.

The plant is a trailing slender stemmed herb. It belongs to the tribe Phaseoleæ. Generally cultivated as a hot weather crop (June-July) and reaped in autumn (October to November) and specially suited to dry, light, sandy soils and for green manuring. The beans are used in Bombay as vegetable. The pulse is split and cooked in various ways. (A. H. Church.)

14 to 17. Phaseolus lunatus, *Linn.* Lima or Duffin Bean. N.O. Leguminosæ.

Hind. Kursumbulle-pullie, Bunbur-butti.

This is a tall twining biennial herb. The pod is 2 to 3 inches long by $\frac{3}{8}$ to $\frac{5}{8}$ inch broad. The exhibit is from Rangoon. This was purchased at Madura where it is being sold. Cultivated in Assam, Burma, Bengal, Punjab, etc. This is one of the species of Phaseolus which sometimes exhibits marked poisonous properties. Used as food for cattle. But as it has been often show that it contains the poisonous Prussic acid, it is not very much used as food. (A. H. Church.)

18 to 20. Phaseolus Mungo, *Linn.* The Green Gram. N.O. Leguminosæ.

Tam. Pachai payaru. *Tel.* Pesalu.
Kan. Hesaru. *Hind.* Dord, Thekiri, Mug.

Phaseolus mungo and Phaseolus radiatus are often mixed up together. Phaseolus mungo proper has two varieties. One has large black seeds and the other has small greenish seeds. Very widely cultivated in South India in almost all districts. The sowing takes place at the commencement of the rains and the crop ripens, one variety in August and September and the other in October and November. The green pods are eaten as vegetable and the ripe grain is the most esteemed of all pulses in India. Boiled and eaten whole or after being split in the form of dal. Made into sweet kanji and drunk as regular food. Made into cakes. Also extensively used as horse and cattle food. (A. H. Church.)

21. Same as 18, 19 and 20.

Tam. Kalpayaru.

The exhibit is from Madura.

22 & 23. Phaseolus Mungo, *Linn.* Variety—Radiatus, Linn. N.O. Leguminosæ.

Tam. Oolundu. *Tel.* Woththulu.
Kan. Wuddu. *Hind.* Mung.

The plant has elongated twining stems. The pod is $1\frac{1}{2}$ to $2\frac{1}{2}$ inches long by $\frac{1}{6}$ to $\frac{1}{5}$ inch broad. It contains 10—15 seeds. The pods are densely clothed with hairs. The seeds vary in colour and size. They are sometimes dull and sometimes shining. Cultivated in most of the rice growing districts of South India. Most esteemed pulse of South India. Used for making cakes and other articles of food. The husk of the seeds forms a valuable food for cattle. (A. H. Church.)

24. Phaseolus trilobus, *Ait.* The three-lobed Kidney Bean. N.O. Leguminosæ.

Tam. Pani-payre, Nari payir. *Tel.* Pilli persara.
Hind. Mugani, Trianguli.

Commonly cultivated all over South India especially in the Deccan. A herbaceous, procumbent diffuse plant. The pod is hairy. The seeds are eaten by the poorer classes. It affords good fodder. (Watt's Dy.)

25. **Pisum sativum**, *Linn.* N.O. Leguminosæ.

Tam. Pattanie.
Kan. Batgadle.
Tel. Patanlu.
Hind. Mattar, Gol-mattar Buttani Chola.

This genus comprises the grey or field pea and the common garden pea. They are abundantly cultivated in South India, chiefly in Nilgiris and Mysore. The genus belongs to the tribe Vicieæ. The garden pea is a familiar annual herb with pinnate leaves terminating in tendrils and large stipules. The pea prefers heavy ground and receives little cultivation, manure or irrigation. The sowing takes place in October and November and the crop is cut in February, March or April. The green pods are largely eaten before the general crop is cut. The field pea, Pisum arvense, *Linn.*, is a variety of this species. Sown and reaped at the same time as the garden species. The green pods and the seeds are eaten as food. The green plant and also the straw are extensively used and valued as fodder. (A. H. Church.)

26 & 27. **Vicia Faba**, *Linn.* The Garden Bean. N.O. Leguminosæ.

Hind. Bakla, anhuri.

A slender annual belonging to the tribe Vicieæ. An introduced plant grown in gardens here and there. The seed is sown about the middle of October. Used as a green vegetable. (Dr. Watt's Dy.)

28. Same as 26 and 27.

The exhibit is from Madura.

29. **Vigna Catiang**, *Walp.* Cow Gram or Chowlee. N.O. Leguminosæ.

Tam. Karamani.
Kan. Alasandi.
Tel. Alasandalu.
Hind. Lobia, Rawas, Ransa, Souta, Bora.

Vigna is a genus of Euphaseoleæ, a sub-tribe of Phaseoleæ. A sub-erect herb commonly cultivated in all the hot districts of the Presidency. The variety sinensis is a climbing herb cultivated in most parts of India. The white seeded kind is generally considered the best. The grain is eaten either as flour or split as dal and the green pods are plucked when young and eaten as a vegetable. This exhibit is from the Agricultural Farm, Trivandrum. (A. H. Church.)

30 & 31. Same as 29.

The exhibits are from some districts of the Madras Presidency.

32 to 42. Same as 30 and 31.

The exhibits are from the Government Agricultural Farm, Koilpatti. We have red and black seeds and of different sizes too.

CONDIMENTS AND SPICES.

1. Allium Cepa, *Linn.* N.O. Liliaceæ.

Hind. Piyaz.
Tam. Vengayam.
Tel. Vulli-gaddalu, Nirulli.
Kan. Vengayam, Nirulli, Kumbali.

This is a bulbous herb. Extensively cultivated all over South India. The seed beds are sown about September and the seedlings transplanted in November or early in December. The crop is lifted from March to May. Onions are extensively used as food by Muhammadans and a little less so by Hindus. The onion also makes excellent pickle. (Watt's Dy.)

2. Allium sativum, *Linn.* N.O. Liliaceæ.

Hind. Lasan or Lahsan.
Tam. Vellai-poondu.
Tel. Tella gadda.
Kan. Belluli.
Mal. Velluli.

A cultivated bulb, common all over South India. The bulbs are numerous and are enclosed in a common membranous covering. Used in curries by almost all Hindus. (Watt's Dy.)

3. Amomum subulatum, *Roxb.* The Greater Cardamom. N.O. Scitamineæ.

Hind. Bari-ilachi.
Tam. Periya elan.
Tel. Pedda elekkalu.
Kan. Dodda-yalakki.

A native of Nepal. A herbaceous plant with a thick root stock and leafy branches ascending from the ground. The fruit is about the size of a nutmeg, irregularly obcordate, flattened antero-posteriorly, having 15 to 20 irregular dentate-undulate wings, which extend from the apex downwards for two-thirds of the length of the cardamom. The fruits are much used in the preparation of sweetmeats on account of their cheapness. (Dr. Watt's Dy.)

4. Brassica alba, *H.F. & T.T.* White Mustard Seeds. N.O. Cruciferæ.

Hind. Sufed-rai, Sufed-rayan.
Tam. Vellai kadugu.
Tel. Thella avalu.
Kan. Bili sasave.

A small herbaceous plant, cultivated all over South India. The seeds are used as food by natives of India.

5. Capsicum frutescens, *Linn.* Chillies or Spur Pepper. N.O. Solanaceæ.

Hind. Lal mirch, marcha, mirch, gachmirch.
Tam. Milagay.
Tel. Mirapakaya.
Kan. Mēna.-siva-kani.
Mal. Kappal Melaka.

A perennial herb, cultivated throughout South India, especially in the districts of Guntūr, Gōdāvari, Kistna, Salem, Trichinopoly, etc. Two or three species yield the various forms of chillies, Red Pepper and Cayenne Pepper. The chilli powder is much used for flavouring pickles, by Hindus and Muhammadans. Also used to flavour in general all food like soups, curries, etc.

6. **Carum Carni**, *Linn.* Caraway Seed. N.O. Umbelliferæ.

Tam. Simai Sombu. *Tel.* Shima Sompu.
Hind. Shiā-jirā.

An annual herb, cultivated for its seeds on the hills and plains of India. The seed is used entire or powdered, in curries, cakes, and confectionery. (Dr. Watt's Dy.)

7. **Carum copticum**, *Benth.* The Bishop's Weed. N.O. Umbelliferæ.

Tam. Omam. *Tel.* Vomamu.
Hind. Ajowan, Ajwain. *Kan.* Voma.

An erect annual, cultivated throughout India for its fruits. Used in the preparation of some sweetmeats, and in general for all foods.

8. **Carum Roxburghianum**, *Benth.* N.O. Umbelliferæ.

Hind. Ajmud, Ajmod. *Tam.*, *Tel.* and *Kan.* Ajumatha Omam.

A herbaceous plant, cultivated throughout South India. Used in flavouring curry. Used by the Europeans as a substitute for parsley. (Dr. Watt's Dy.)

9. **Caryophyllus aromaticus**, *Linn.* The Clove. N.O. Myrtaceæ.

Tam. Krambu. *Tel.* Lavangalu.
Hind. Long, Laung. *Kan.* Lavanga.
Mal. Karambu.

A tree indigenous to the Moluccas. Cultivated in South India. Used in the preparation of some sweets. Also chewed along with betel leaves and nuts.

10. **Cinnamomum zeylanicum**, *Breyn.* N.O. Laurineæ.

Tam. Lavanga pattai. *Tel.* and *Mal.* Lavanga Patta.
Hind. Dalchini, qualam-dar-chini. *Kan.* Dalchini.

A large tree, native of Sumatra and cultivated in South India, especially in the district of North Malabar. Used as a condiment and for flavouring confectionery; also in curry and in the preparation of flavoured nuts, for purpose of chewing.

11. **Cocos nucifera**, *Linn.* The Coconut Palm. N.O. Palmæ.

Tam. Tēngai. *Tel.* Tenkaya or Goprakaya.
Hind. Nārel, Nāriyal. *Kan.* Tengina Kayi.

Found all along the coast in South India. A well known tall palm tree with a crown of large pinnate leaves at the top. Extensively cultivated in Travancore, Cochin, Malabar, Kanara, Ganjām, Gōdāvari, etc. The natives of Malabar use it for every preparation they make. In fact there is not a single preparation of food of the Malayalees in which this is not used. The natives of Kanara use it less extensively. Used by the people of the Tamil and Telugu speaking districts, much less extensively, for flavouring their curries, soups, etc.

12. Coriandrum sativum, *Linn.* Coriander. N.O. Umbelliferæ.

Tam. Koththamali. *Tel.* Dhaniyalu.
Hind. Dhanya or dhaniā. *Kan.* Koththumbari.

A small annual herb, cultivated all over South India, especially in the Ceded districts. As a condiment this seed forms one of the indispensable ingredients of native curry. Also employed to flavour soups and sweetmeats.

13. Crocus sativus, *Linn.* Saffron. N.O. Irideæ.

Tam., *Tel.* and *Kan.* Kungkumpoo. *Hind.* Kesar, Zafran.

A perennial herb with a rootstock in the form of a sheathed corm. Sheaths of corms closely reticulate, stem 1. Extensively cultivated in Kashmir and a native of the South of Europe. Used by Hindus in all sweet preparations.

14. Cuminum cyminum, *Linn.* The Cumin. N.O. Umbelliferæ.

Tam. Siragam. *Tel.* Jilakara.
Hind. Zira. *Kan.* Jinge.

A slender annual herb. Widely cultivated in Rajputana and other parts of North India. Used by the Hindus in the preparation of soups and in flavouring curry. The cumin is supposed to be very good for people with bilious affections. Also supposed to have stomachic and aromatic properties.

15. Curcuma longa, *Roxb.* The Turmeric. N.O. Scitamineæ.

Tam. Manjal. *Tel.* Pasapu.
Hind. Haldi. *Kan.* Arisana.
Mal. Mannal.

An annual with large ovoid root stocks. The tubers are sessile and bright yellow inside. Widely cultivated all over South India. The tubers are powdered and used as an important ingredient in soups, curries, etc.

16. Elettaria cardamomum, *Maton.* Lesser Cardamom. N.O. Scitamineæ.

Tam. Elakkai. *Tel.* Elakayalu.
Hind. Choti elāchi, ilāyechi. *Kan.* Valakkikayi.

A perennial herb with a horizontal thick root stock. Cultivated chiefly in Malabar, Madura, Anamalais, Mysore and Coorg. This is the most valuable of all the Indian condiments. Extensively used for flavouring purposes and is also eaten along with betel leaves and nuts. See fresh specimen in bottle in Hall I.

17. Ferula alliacea, *Boiss.* Asafœtida. N.O. Umbelliferæ.

Tam. Perungayam. *Tel.* Inguva.
Hind. Hing. *Kan.* Hinguve.

See Gums and Resins. The gum resin is employed by the natives of all parts of India as a condiment and is specially prized by the vegetarian Hindu classes. It is mixed in various ways with rice, dal, etc.

18 & 19. Myristica fragrans, *Houtt.* The Nutmeg, Mace. N.O. Myristiceæ.

Hind. For the aril, Japatr; for the seed Jayphal or Jæphal.
Tam., *Tel.* and *Kan.* Japathri.
Tam and *Mal.* Jadikai.
Tel. Jaji kayalu.
Kan. Jaji kayee.

A native of the Moluccas and cultivated in South Indian forests, especially in Malabar. Used along with betels and nuts in chewing. Used as a condiment in many food preparations. See fresh specimen in bottle.

20. Nigella sativa, *Linn.* The Black Cumin. N.O. Ranunculaceæ.

Tam. Karum Shiragam.
Tel. Nalla jilakara.
Hind. Kalonji, Kālajira.
Kan. Karijirige.

A native of Southern Europe, and extensively cultivated in many parts of India. The seeds have a strong pungent, aromatic taste and are much used by Hindus in curries and other dishes.

21. Peucedanum graveolens, *Benth.* The Dill or Sowa. N.O. Umbelliferæ.

Hind. Sowa, Soja.
Tam. Satakuppi.
Tel. Sompa.

A perennial glabrous herb, cultivated in the plains of tropical and subtropical India. The seeds are eaten in curry. (Watt's Dy.)

22. Phaseolus mungo, *Linn.* N.O. Leguminosæ.

See 22, 23, South Indian pulses.

23. Piper Cubeba, *Linn.* N.O. Piperaceæ.

Hind. Kabab Chini, Val-Milaku.
Tam. Val Milagu.
Tel. Chalara Miryalu.
Kan. Gunda Menasu.
Mal. Val Molagu.

A native of Java and cultivated to a small extent in Malabar. The fruit has carminative properties and is used in chewing pan (betel leaves and nuts).

24. Piper nigrum, *Linn.* N.O. Piperaceæ.

Tam. Vellai milagu.
Tel. Tella miryalu.
Hind. Gulmirch, mirch, Kali-mirch.
Kan. Bili menasu.

A native in the forests of Malabar and cultivated in hot damp parts of India. A stout climber. Carminative and digestive. Very widely used as a condiment in curry and other dishes. See preserved specimen in bottle in Hall I.

25. Tamarindus indica, *Linn.* The Tamarind Tree. N.O. Leguminosæ.

Tam Puliyamaram.
Tel. Chinta Chettu.
Hind. Amli, Ambli, Unli, Nuli.
Kan. Hunase mara.

A very common evergreen tree, distributed all over the Presidency, especially in the hot districts. The fruit is an ingredient of curries, soups, and *chatnis*. The Tamarind is very largely used by the Hindus of South India.

26. Trigonella Foenum-græcum, *Linn.* The Fenugreek or Fenugræc. N.O. Leguminosæ.

Tam. Vendayam, Ventayam. *Tel.* Mentulu, menti Kūra.
Hind. Mēthi, Mūthi. *Kan.* Mēnthya, Mente Soffu, Mente-palle, Mente.

A robust annual herb, wild in Kashmir, the Punjab and the Upper Gangetic plain. Widely cultivated practically all over South India. The leaves when young are eaten as vegetable. The seeds are used as a condiment to flavour curries made of rice, pulse, flour, etc. Also employed to prepare cakes along with the jaggery, etc.

MISCELLANEOUS FOODS.

(*N.B.*—The specimens are exhibited in formalin in bottles arranged around a pillar on a shelf.)

1. Achras sapota, *Linn.* The Sapodilla Fruit. N.O. Sapotaceæ.

Tam. Shimai-iluppai. *Tel.* Simaippa.
Hind. Sapota. *Kan.* Kumpole.

Common in South India. An introduced plant from America. An evergreen, fairly big tree. The fruit is as big as a hen's egg, and brown with a mealy surface. The fruit is nutritious and is eaten largely by all people.

2. Anona squamosa, *Linn.* The Custard Apple. N.O. Anonaceæ.

Tam. Sitapalam, Sitapazham. *Tel.* Sitapandu.
Hind. Sharīfah, āt or āta Sitaphal or Sitāfal.

A small evergreen tree, very common all over South India in the plains. The fruit ripens in summer and is eaten with relish by both Europeans and Indians. The fruit has often proved a good food in times of famine.

3. Artocarpus integrifolia, *Linn.* The Jack-Fruit Tree. N.O. Urticaceæ.

Tam. Pala. *Tel.* Panasa, Panasa Pandu.
Hind. Kanthol, Katol, Kāthal Chakki, panasa, panas. *Kan.* Halsu, heb-helsu, halsina.

This is a large evergreen tree, cultivated throughout South India. Most common in the Malabar district and Travancore. Supposed to be wild in the mountain forests of Western Ghats, ascending to 4,000 ft. (Beddome, Wight.) The fruits are large reaching in some cases to a length of 2½ ft. When unripe the fruit is eaten as a vegetable after it is cooked. When ripe eaten as fruit.

4. Borassus flabellifer, *Linn.* The Palmyra Palm. N.O. Palmæ.

Tam. Panai, Panamaram. *Tel.* Potu tati, penti tate, Tati chettu.
Hind. Tal, Tala, Tar, Tari. *Kan.* Tala, Talē, Pane.
Mal. Pana, Tālam.

One of the commonest palms in Southern India. Common everywhere and specially in Madura, Rāmnād, and Tinnevelly districts and Travancore. It is a tall palm and has fan-shaped leaves. The young seedling is eaten as food especially by the poorer classes. They are usually boiled and eaten just as people eat potatoes or sweet potatoes.

5 **Brassica campestris**, *Linn.* N.O. Cruciferæ.

To this species belong the vegetable Turnip, the Rape whose seeds are very valuable for its oil, Colza and others which are more common in Europe than in India. The Indian forms of this species are represented by two varieties, namely, the Var. Dichotoma (Sarsōn) and the Var Toria.

(1) Dichotoma.

Kali Sarson (The Indian commercial name).

Tam. Karuppu Kadugu. *Tel* Nalla Avālu.
Hind. Kalī Sarsōn. *Kan.* Kappu Sasœ.
Mal. Karuppa Katuka.

They are cultivated in private gardens on the hills and in Bangalore in South India. The plant is a herbaceous one. The upper leaves are lyrate or entire, amplexicaul, lower auricled deeply pinnatifid, the ground ones hairy. The Turnips are used as food.

(2) Var. Toria.

Hind. Torī, torīya, dāin-lai.

Grown near the Himalayas. The whole plant is quite smooth and glaucous, 2 to 3 ft. in height. The leaves are used for culinary purposes. (Watt's Dy.)

6. **Capsicum grossum**, *Willd.* Bell Pepper. N.O. Solanaceæ.

Beng. and *Hind.* Kafri-murich. *Tam.* Koda Mulagai.

Commonly cultivated in the Tanjore district especially near about the Tanjore town It is a herbaceous small plant. The fruit is a common vegetable among the Hindus The fleshy skin is not so hot as that of other species.

7. **Cephalandra indica**, *Schrad.* N.O. Cucurbitaceæ.

Hind. Bhimb, Kanduri-kī-bēl or Kanduri. *Tam.* Kovai.
Tel. Donda, bimbika, Kakidonda. *Kan.* Tonde Balli.
Mal. Kova.

Common both as a wild and cultivated plant all over South India. A harbaceous green climber and has tendrils like the other plants of Cucurbitaceæ. The fruit is eaten as food when ripe. When green it is cooked into curries.

8. **Coffea arabica**, *Linn.* N.O. Rubiaceæ. See under Beverages, page 76.

9. **Cucurbita pepo**, *D.C.* The Pumpkin, Vegetable Marrow. N.O. Cucurbitaceæ.

Beng. and *Hind.* Kumra, Safed Kaddu, Lanka, Konda, Kumarah, Kadimah.
Tam. Pushani, Parangi Kai. *Kan.* Kumbala Kayi.

Cultivated throughout South India for the sake of its fruits. Often allowed to spread over the roof of the house. The plant is a climber by means of tendrils. The leaves are 5-palmate. Sinus broad and segment painted ; petiole as long as the blade, the hairs of the lower surface being hardened into prickles. The fruit is eaten as a delicious vegetable.

10. Elettaria cardamomum, *Maton.* N.O. Scitamineæ. See Condiments and Spices, page 94, article 16.

11. Eugenia jambos, *Linn.* The Rose Apple. N.O. Myrtaceæ.

Hind. Gulāb-Jaman. *Sansk.* Jambu.

Kan. Pannerali.

A small handsome tree, cultivated all over the plains in South India. Also grown as an ornamental tree in private gardens for its beautiful flowers, foliage and fruits. The fruit is produced during the rainy season. About the size of a small apple. Highly esteemed on account of its flavour which resembles rose water.

12. Maranta arundinacea, *Linn.* The Arrowroot. N.O. Scitamineæ.

Hind. Tikhor. *Tam.* Kuva mairi or Kua mari.

Kan. Tavaksha. *Mal.* Kūa, Kughei.

The extent to which this is cultivated in South India is not well known. Probably what passes off as the arrowroot of South Indian production, is the arrowroot obtained from curcuma augustifolia. Arrowroot is obtained in Travancore, Malabar and other districts of South India. The whole cultivation and the manufacture of the flour is done in a very primitive way.

The plant is a small harbaceous one growing to 2 to 3 ft. in height. The flowers and the tubers are white. The roots yield the flour. The value of arrowroot flour as an excellent food especially for invalids is well known to all. (Watt's Dy.)

13. Myristica fragrans, *Houtt.* N.O. Myristiceæ. See Condiments and Spices, article 19, page 95.

14. Piper nigrum, *Linn.* N.O. Piperaceæ. See Condiments and Spices, article 24, page 95.

15. Saccharum officinarum, *Linn.* The Sugarcane. N.O. Gramineæ.

Tam. Karumbu. *Tel.* Cheruku, ārukanupula—Krānuga.

Kan. Khabbu, basari mara. *Mal.* Karinpa, Karimba.

Hind. Ukh, gannā, rīkhu, kumad.

The sugarcane is a tall perennial grass. Indigenous to India. Its stem is solid and it produces aerial roots from its nodes. Apart from indigenous varieties a number of foreign varieties have been introduced into India and many of them are now being cultivated with success. In the Madras Presidency the chief districts in which it is being cultivated are Ganjām, Vizagapatam, Bellary and Coimbatore. The sugarcane thrives well in a loamy soil where enough water and good drainage conditions can be obtained. The sugarcane is of great economic importance by the fact that it yields the largest quantity of sugar than any other sugar yielding plant. Next to

sugarcane comes Beet (Beta vulgaries) in yield. In India sugar is also obtained from the Date Palm (Phœnix Sylvestrs). Though indigenous to India, the best varieties of sugarcane are now generally found in those countries where European and American planters have been employed in its cultivation. The following important varieties that are being cultivated at the Government Agricultural Farm at Samalkota, Gōdāvari, are exhibited:—

1. Barbados Seedling cane.
2. Do. B. 147.
3. Do. B. 208.
4. Do. B. 376.
5. Do. B. 1529.
6. Do. B. 3412.
7. Do. B. 3412.
8. Barbados Smoking Cane.
9. Green Sports Mauritius.
10. White Mauritius.
11. Red Sports Mauritius.
12. Ashy Mauritius.
13. Striped Mauritius.
14. Dark Striped Mauritius.
15. Red Mauritius.
16. Ivory Mauritius.
17. Tana Blanche.
18. Mogalli Cane.
19. Buthan Kalle.
20. Fiji C.
21. Fiji E.
22. Java Seedling Cane.
23. Java 36.
24. Java 247.
25. Long Striped Singapore.

6. Theobroma cacao, *Linn.* Cocoa. N.O. Sterculiaceæ.

A small tree which is wild in the forests of the Amazon and Orinoco basins and of their tributaries up to 400 feet of elevation. It is not very common in South India. It is widely cultivated in Ceylon, except in Malabar. The fruit which is from 6 to 10 inches long and 3 to 5 inches wide contains 50 or more seeds. From these seeds the cocoa powder used for drinking and the chocolate are prepared. The solid oil known as "Cocoa butter" and widely used in pharmacy is obtained by pressing warmed seeds. (Watt's Dy.)

DYES AND TANS.

1. Acacia arabica, *Willd.* Babul, Indian Gum Arabic tree. N.O. Leguminosæ.

Tam. Karruvēlam, karuvēl.
Tel. Nallatumma, Tumma.
Kan. Jāli, Karioēla, Karijāli, Rāmakanti.
Mal. Karuvēlakam.
Hind. Babūl, Babla, Kikar.

A tree of the Deccan and the Carnatic frequenting black cotton soil, old tank beds and mounds among rice fields. The bark, pods and leaves form important tanning and dyeing materials. A decoction of the bark is used for dyeing various shades of brown, while the boiled pods are used for the preparations of a black colour in Northern India. (Dr. Watt's Dy.) Fishermen sometimes employ this dyestuff for caulking fishing lines, nets and sails.

2. Acacia catechu, *Willd.* Catechu, Cutch, Catechu Nigrum, Pegu-catechu, N.O. Leguminosæ.

Tam. Kāchukatti, Kadiram, Odalai, Chengarungāli, Chirumārodum, Karungāli, Kōdam.
Tel. Kāchu, Podalamānu, Chandra, Nallachandra, Pasaraganna.
Kan. Kanti, Khadira, Kāchu, Kaggali, Seredu, Banni.
Mal. Kadaram, Chenkarinnāli.
Hind. Khair, Khairbabul, Katha.

A spiny tree, common in the dry forests of South India. The chief product of the tree is catechu which is an important catecholan. This is obtained from trees that have much white substance in the pores of the wood. It is obtained by cutting the wood into chips and then placing them in a sieve inside a boiler with water below. As the water boils the steam passes through the chips and extracts the kath which is taken as a sediment and dried. (Watt's Dy.).

3. Acacia Farnesiana, *Willd.* Cassie Flower. N.O. Leguminosæ.

Tam. Kadivēl, Vēdumul, Kattūrīvēl.
Tel. Kamputumma, Kastūritumma, Murīkitumma, Nāgatumma, Pīketumma.
Kan. Kastūrijāli.
Mal. Pīvēlam.
Hind. Vilayati-kikar, Vilayatibabūl, Pissibabul, Gūkikar, Gandbabūl.

An American shrub cultivated in various parts of South India. The bark and pods are said to be used as tanning and dyeing materials. (Watt's Dy.)

4. Acacia intsia, *Willd.* N.O. Leguminosæ.

Tam. Vellindangodi, Vellindu, Kāriyindu, Mandarchīngai.
Tel. Koralakōrinda, Kōrinda, Kondakōrinda, Tellakōrinda.
Kan Antarike, Chandemullu.
Mal. Attuchīni, Attu, Inna, Incha.

A large climbing shrub, common all over South India. The bark or the fresh leaves are said to be used as an auxiliary or astringent in dyeing with aldye or lac, giving brightness. (Watt's Dy.)

5. **Acacia Cuccphlœa**, *Willd.* N.O. Leguminosæ.

Tam. Velvélam, Velvēl.
Tel. Tellatumma.
Kan. Bilijāli, Nayibēla, Toppalu, Tumbe, Darukhagar.
Mal. Vellavēlakam, Velvēlam.
Hind. Safedkikar, Rerū, Raung, Karir, Nimbar, Ringa, Rin Kohani, Jhind.

A tree common in the dry forests of South India. The leaves and bark are used as dyestuffs. They give a black colour. (Watt's Dy.)

6. **Achyranthes aspera**, *Linn.* Prickly Chaff flower. N.O. Amarantaceæ.

Tam. Nāyurivi. *Tel.* Uttarēni, Antisha.
Kan. Utrāni. *Mal.* Katatati.
Hind. Latjirā, Chichra, Chirchitta.

A common weed, found all over South India, chiefly in dry places. The ashes of the plant form a mordant and are used as an alkali in dyeing. (Watt's Dy.)

7. **Adhatcda Vasica**, *Nees.* N.O. Acanthaceæ.

Tam. Ādādōdai, Kāttumurungai, Vāchai.
Tel. Addasaramu, Atarūshamu.
Kan. Adusōge, Adumuttada. *Mal.* Ātālōtakam.
Hind. Arūsā, Adalsā, Adārsa.

A shrub, common all over South India. The leaves yield an yellow dye which is extracted by boiling them in water till half the water has evaporated. The dye is used for coarse cloths. (Watt's Dy.) Besides yellow, dark blue-green is produced by it in combination with indigo.

8. **Aegle Marmelos**, *Corr.* Bael or Bel Fruit tree, Bengal Quince. N.O. Rutaceæ.

Tam. Vilvam, Mávilangai, Kūvilam, Iyalbūdi, Aluvīgam.
Tel. Bilvamu, Mārēdu, Sailūshamu, Sāndiliyamu, Mālūramu.
Kan. Bilva, Kumbala, Mālūra, Billadu.
Mal. Kūvalam. Mávitávu, Vilvam.
Hind. Bēl, Sīphal, Siriphal.

A tree, common in the dry forests of South India, often cultivated. The rind of the fruit yields an yellow dye, the unripe rind is also used with myrobalans by calico printers. (Dr. Watt's Dy.)

9. **Albizzia lophantha**, *Benth.* N.O. Leguminosæ.

A small Australian tree naturalised on the Nilgiris. The bark is said to be useful for tanning. (Watt's Dy.)

0. **Albizzia procera**, *Benth.* N.O. Leguminosæ.

Tam. Chālaiyunchil, Kondaivágai.
Tel. Ganaru, Kondadirisanamu, Peddapacharu, Tellachinduga, Tellasāpara.
Kan. Adhanji, Bāge, Belati, Sālābāge, Sālagūdi.

Mal. Karuntakara, Kutamvāka, Vāka, Vellavāka, Chālavāka.
Hind. Safedsiris, Gurar, Karra, Karo, Karanji, Gurbāri, Gurkur Baro, Karolu, Garso.

A large deciduous tree common all over South India. The bark i sometimes used for tanning. (Watt's Dy.)

11. Anogiessus latifolia, *Wall.* N.O. Combretaceæ.

Tam. Namai, Vekkāli, Vellanāgai, Vellainamai.
Tel. Chirimānu, Sirimanu, Yellamaddi.
Kan. Bejjalu, Dindala, Dindiga, Dhibedi, Tirapu.
Mal. Malakānniram, Marukānniram, Vellanāva.
Hind. Dhāvā Dhāurā, Dhāuri, Dhau, Dhauta, Dohu, Bakla, Bakli.

A large deciduous tree of the dry forests of South India. The leaves yield a black dye and are also said to be useful for tanning. (Watt's Dy.)

12. Areca catechu, *Linn.* Areca or Betelnut palm. N.O. Palmæ.

N.B.—Exhibited in the case containing dyed woollen articles.

Tam. Pākku, Kamugu. *Tel.* Vakka, Pōkavakka.
Kan. Adike. *Mal.* Atekkā, Kavugu.
Hind. Supāri.

A tall palm, largely cultivated all over South India. The Indians chew the nuts along with betel, lime and spices. This acts chemically on the saliva and colours it red. A decoction of the nut is used in dyeing and an inferior catechu is prepared from it which is used for tanning. (Watt's Dy.)

13. Arthrocnemum indicum, *Moq.* N.O. Chenopodiaceæ.

Tam. Umari. *Tel.* Koyyapippili.

A fleshy leafless shrub of the salt marshes of South India. The ashes of the plant are said to be largely used as a mordant in dyeing.

14. Artocarpus integrifolia, *Linn. f.* Jack. N.O. Urticaceæ.

Tam. Pitā, Palāchu. *Tel.* Panasa.
Kan. Halasu, Panasa. *Mal.* Chakka, Pilāvu, Plāvu, Varikka.
Hind. Kānthāl, Katol, Kāthal, Chakki, Panasa, Panas.

A large tree of the Western Ghats, cultivated in other parts of South India. The wood yields an yellow dye and to extract the dye the saw-dust is generally boiled. The dye is fixed with alum and often intensified by a little turmeric. (Watt's Dy.)

15. Avicennia officinalis, *Linn.* White Mangrove. N.O. Verbenaceæ.

Tam. Kandal, Uppukkurri, Uppattam, Vengandal, Karungandal.
Tel. Mada, Tellamada, Nallamada, Eriva, Erivōgu, Gundumada.
Kan. Uppati. *Mal.* Ūri, Ūrppam.

A shrub or small tree of the salt marshes and tidal forests of South India. The bark is used as a tanning material. The ashes of the wood are used for washing and cleaning cotton cloths. (Watt's Dy.)

16. **Bassia latifolia,** *Roxb.* Butter or Mahuā Tree. N.O. Sapotaceæ.

Tam. Iluppai, Madūgam, Kāttiluppai.
Tel. Ippa, Adaviyippa, Peddayippa.
Kan. Kādippe, Hūnage. *Mal.* Irippa, Pūvuna.
Hind. Mahwā, Mahnā, Mahulā, Maul, Janglimohā, Janglimohvā Maowā.

A large tree, common in all the deciduous forests of South India, found often in a cultivated state. The bark is used as an adjunct in dyeing where dark colours or black are desired ; along with the leaves it is sometimes used as a tan. (Watt's Dy.)

17. **Bauhinia variegata,** *Linn.* N.O. Leguminosæ.

Tam. Segappumandārai, Vellaippūvātti.
Tel. Bōdanlā, Dēvakānchanamu, Mandāra.
Kan. Kānchivāla, Ārisantige.
Mal. Kōvidāram, Unnu, Chuvanna mandārām.
Hind. Kachnār, Koliār, Kurāl, Padriān, Khwairaal, Guriāl, Gwiar, Bariāl, Kamian, Kāndan, Khairwāl.

A deciduous tree of the dry forests of South India. The bark is used for dyeing and tanning. (Watt's Dy.)

18. **Berberis aristata,** *D.C.* Barberry. N.O. Berberideæ.

Tam. Mullukkatā, Ūchikkatā. *Kan.* Bagisūtra.
Mal. Maramannal.

A tree of the Western Ghats and the Nilgiris at high elevations. The root and stem yield an yellow dye used for tanning and dyeing leather. (Watt's Dy.)

19. **Berberis nepalensis,** *Spreng.* N.O. Berberideæ.

Tam. Kata, Mullukkadambu, Mullukata, Mullumurumga, Tariki Marantu.
Kan. Tarike. *Mal.* Marantu.

An evergreen shrub or small tree of the Nilgiris and other hill ranges at 5,000 to 8,000 feet. The root and stem yield an yellow dye which is used in tanning and colouring leather. The colour exists chiefly in the bark. The Barberry is one of the best dyes in India.

20. **Bixa orellana,** *Linn.* Arnatto or Arnotto Dye. N.O. Bixineæ.

Tam. Āvam, Chāppirāvirai, Euragumancal, Manchitti, Venney-virai, Amudadaram.
Tel. Jābura.
Kan. Arnattu, Kēsari, Japhredu, Rangamalai.
Mal. Kuppamannal. *Hind.* Latkan, Watkana.

An evergreen American tree, cultivated in various parts of South India, naturalized on the West Coast. The red pulpy covering of the seed yields the Arnatto dye. It is prepared by macerating the pod in boiling water, extracting the seeds and allowing the pulp to settle. The resulting fluid is later on thrown away and the residue is dried in the shade. The dye is of a bright yellow colour and imparts a deep orange colour to silk and cotton. In Europe the dye is used to colour butter, cheese, oils and varnish. (Liotard Memo. on Dyes.)

21. Bruguiera gymnorhiza, *Lamk.* N.O. Rhizophoreæ.

Tam. Sigappukkākkandal. *Tel.* Dudduponna, Ponna.
Mal. Kantal.

An evergreen tree of the muddy shores and tidal creeks of South India. The bark is astringent and used for dyeing and tanning purposes. (Dr. Watt's Dy.)

22. Buchanania latifolia, *Roxb.* Cuddapah Almond. N.O. Anacardiaceæ.

Tam. Āymā, Sārai, Kāttumā, Mudaichai, Mudaimā, Muraiyidam, Morala.
Tel. Chāra, Chārumāmidi, Chinnamōralli, Jarugu.
Kan. Murukāli, Nurukkal, Muruke, Irippa.
Mal. Kālamāvu, Munnalpēru, Nuruvi.
Hind. Piyar, Piyāl, Piyāla.

A tree of the dry forests of South India. The bark is used in tanning. (Watt's Dy.)

23. Butea frondosa, *Roxb.* Bastard Teak. N.O. Leguminosæ.
N.B.—Exhibited in the case containing dyed woollen articles.

Tam. Chīrā, Kāli, Kāttumurukku, Kinchugam, Kirumichatturu Murukku, Palāchu, Punamurukku, Punamarungai, Pungus Pūppalāchu, Purachu, Tikkuru, Vādabodum, Vallai, Vallaipurachu, Mukkappiryam.
Tel. Kimsukamu, Mōduga, Palāsamu, Tellamoduga, Togarumōduga, Vātapōdhamu.
Kan. Brahmavrykhsha, Muttuga, Muttala.
Mal. Palāsi, Murikku.
Hind. Dhāk, Palās, Tēsukāpēr, Kakria, Kankrei, Chichra.

A tree, common, all over South India, chiefly on the plains. The bright red flowers, both when fresh and dry yield an yellow dye which is bright and beautiful but not permanent. To extract the colour, the flowers are either simply immersed in water or boiled. The dye is employed for cotton cloths and carpets. The gum which exudes from the tree is often used as a dye and tan. (Liotard Memo. on Dyes.)

24. Cæsalpinia coriaria, *Willd.* American Sumach or Divi-divi, N.O. Leguminosæ.

Tam. Kōdichīttal, Kōdivēlam. *Kan.* Vilāyatīyaldekāyi.

A South American tree, cultivated in various parts of South India. The pods form a very important tanning material and besides they yield a black dye. (Watt's Dy.)

25. Cæsalpinia sappan, *Linn.* Sappan Wood. N.O. Leguminosæ.

Tam. Chappangu, Padangam, Varattangi.
Tel. Bukkamu, Kappuramaddi, Okānu, Patanga.
Kan. Patrānga, Sappanga. *Mal.* Chappanam, Patrangam.
Hind. Bakam, Tairi, Patang.

A tree of Chittagong and Burma, largely cultivated in various parts of South India. A valuable red dye is obtained from the wood which

is exported for that purpose. The pods and bark are also said to yield a red dye while the roots afford an yellow dye. Sappan wood is largely used for cotton cloth, for calico printing and for carpets and in Palghat for colouring the grass mats made there. (Liotard Memo. on Dyes.)

26. **Cæsalpinia sepiaria**, *Roxb.* Mysore Thorn. N.O. Leguminosæ.

Tam. Pulitta dukki, Īndu. *Tel.* Gaddakōrinda.
Kan. Gajalike, Hōtasīge, Hunnulla, Kenchige, Kurudugajjiga.
Mal. Īnna.
Hind. Urn, Ūrī, Arlu, Relū, Kando, Aila.

A shrub, common in the Northern Circars, the Deccan and the districts of Coimbatore and Malabar. The bark is much used for tanning. (Watt's Dy.)

27. **Calotropis gigantea**, *R. Br.* N.O. Asclepiadeæ.

Tam. Erukku. *Tel.* Jilleda.
Kan. Ekke. *Mal.* Yeruku.
Hind. Mudar, safed-ak.

A middle-sized shrub with all its young parts covered by a white powder. It is common in waste lands in South India. The milky sap is made into a paste with the flour of the small millet (Penicillaria spicata) and is used previously to colouring the skin with lac dye. The Indians are said to adulterate safflower with the powdered flour of the root. (Watt's Dy.)

28. **Carthamus tinctorius**, *Linn.* Safflower, Wild or Bastard Saffron. N.O. Compositæ.

Tam. Kushumbā, Sendurgum. *Tel.* Kushumba, Agnisikha.
Kan. Kusanbe. *Hind.* Kusum.

An annual herbaceous plant, cultivated all over South India, chiefly in the districts of Cuddapah, Kurnool, Bellary and Anantapur. The petals of the florets yield the safflower dye of commerce. To prepare the dye the florets on opening are rapidly gathered without being allowed to expand fully and dried in the shade. They are then rubbed between the hands while water is poured on them and after a time all the washed water is allowed to drain off. As a result of this the soluble of the useless yellow dye is removed and the remaining florets are pressed into cakes. The dye is largely used for cotton and silk and the florets are sometimes used to adulterate saffron. (Liotard Memo. on Dyes.)

29. **Cassia auriculata**, *Linn.* Tanners 'Cassia. N.O. Leguminosæ.

Tam. Āvāram, Āvārai, Chadurgūli Chemmalai, Chummai.
Tel. Merakatangēdu, Tangēdu.
Kan. Āvarike, Chākusina, Tangedi, Olaniyaro.
Mal. Āviram, Ponnāvīram. *Hind.* Tarwar.

A shrub, common on dry stony hills and on black cotton soil in South India. The bark is astringent and is largely used in South India for tanning leather and to dye it of a buff colour. (Dr. Watt's Comm. Prods.)

30. **Cassia fistula,** *Linn.* Indian Laburnum, Purging Cassia. N.O. Leguminosæ.

Tam. Charakkonrai, Konrai, Irali.
Tel. Kōlaponna, Rēla, Suvarnamu.
Kan. Kakke, Konde, Ārēvalā.
Mal. Konna, Svarnāvīram. *Hind.* Amaltās Gīrmālah.

A tree of the deciduous forests of South India, often planted in gardens. The bark is used for tanning, chiefly along with Myrobalans ; it also contains a small quantity of colouring matter. The wood ash forms a mordant in dyeing. (Watt's Dy.)

31. **Cassia Tora,** *Linn.* Fœtid Cassia. N.O. Leguminosæ.

Tam. Chēnāvu, Chirudagarai, Vanamāvāram, Vindu.
Tel. Tagirise, Tantemu.
Kan. Tagache, Chogata.
Mal. Chakramardrakam, Takara.
Hind. Chakundā, Panevār.

A small shrub, found all over South India. The seeds are used in preparing a blue dye, generally fixed with lime water. (Watt's Dy.)

32. **Casuarina equisetifolia,** *Forst.* Casuarina, Beefwood of Australia. N.O. Casuarineæ.

Tam. Chouk, Shavukumaram. *Tel.* Chauku, Chavuku, Serva.
Kan. Gāli, Sarve. *Mal.* Chavukku kānāti.
Hind. Janglis arv.

A large evergreen tree of the Malay Archipelago and Australia, cultivated especially near the sea coast in South India. The bark forms a tanning material and also contains a dyestuff. (Liotard Memo. on Dyes.)

33. **Ceriops Roxburghiana,** *Arn.* N.O. Rhizophoreæ.
Tel. Gedera, Ponna.

An evergreen tree of the salt marshes, commonly found in the districts of Gōdāvari, Kistna and Guntūr and in the Coromandel Coast. The bark is used in tanning leather. It also yields a good dye which is used to give a brown colour. (Watt's Dy.)

34. **Coccus cacti,** *Linn.* The Cochineal insect. N.O. Rhynchota.

A native of America and has been introduced into India. The insect feeds on the cactus plants. The colouring matter of cochineal, as of lac, is derived solely from the female insect and is produced only at the period approaching parturition. According to Balfour 20,000 insects dead and dried make up one pound of cochineal, the ordinary value of which is Rs. 1-12-0. It is used in cotton, silk and woollen dyeing. Two different shades are obtained from cochineal, namely, a bluish red called crimson and a yellowish or fiery red called "scarlet." (Watt's Dy.)

35. Coscinium fenestratum, *Colebr.* N.O. Menispermaceæ.

Tam Maramanjal. *Tel.* Mānupasupu.
Kan. Maradarasina. *Mal.* Haridram, Maramannal.

A large climber, common in the Deccan and the West Coast. The wood contains an yellow dye very much like turmeric. (Watt's Dy.)

36. Crocus sativus, *Linn.* The Saffron. N.O. Irideæ.

Tam., *Tel.* and *Kan.* Kungkumpoo.
Hind. Kesar, zafran.

A perennial herb, with a root stock in the form of a sheathed corm, sheaths of corms closely reticulate. Stem o. Corms large globular depressed. Extensively cultivated in Kashmir and a native of the South of Europe. It is chiefly used in Europe as a dye and to colour cheese, puddings, etc. In India its use as a dye is prohibited on account of its high price. (Watt's Comms. Prods.)

37. Curcuma longa, *Linn.* Turmeric. N.O. Zingiberaceæ.

N.B.—Exhibited in the case containing dyed woollen articles.

Tam. Manjal. *Tel.* Pasupu.
Kan. Arishina. *Mal.* Mannal, Marinalu.
Hind. Haldi.

A small plant, cultivated in various parts of South India. The rhizome or underground stem contains an yellow dye which is used for dyeing cloth, etc., or for colouring and flavouring food materials. The fresh rhizomes require a special preparation before they are declared fit for the market. The edible preparation is generally boiled with cow-dung water in order to prevent its being attacked by insects. The rhizome used for dyestuffs is partly dried, boiled and then soaked in hot water in which chunam and tamarind have been added for two or three days and then taken out and dried.

The dye is a very favourite one with Hindu married women who employ it as a paste to colour their bodies yellow and it also plays an important part in the marriage and other ceremonies of the Hindus. (For more information see Watt's Dy.)

38. Curcuma zedoaria, *Roxb.* Long and Round Zedoary. N.O. Zingiberaceæ.

Tam. Kichchilickkizhanghu. *Tel.* Kichiligaddalu, Kachōram.
Pūlānkizhangu. *Kan.* Kachōrā.
Mal. Kichchilikizhanna. *Hind.* Kachūra.

An annual plant, cultivated in various parts of South India. The rhizome yields a dyestuff which is used for preparing a red powder called Abri employed by Hindus in what is known as the Holi festival. (Watt's Dy.)

39. Cuscuta reflexa, *Roxb.* Dodder. N.O. Convolvulaceæ.

Tel. Sītammapōgunūlu.

A parasitic climber, found throughout the plains of South India. The plant is said to yield a dye. (Watt's Dy.)

40. Erythrina indica, *Lam.* Indian Coral Tree. N.O. Leguminosæ.

Tam. Kalyānamurunku, Murunkā.
Tel. Bariyamu, Bādapu, Moduga, Mahāmedi.
Kan. Hīliwāra, Halivana, Paravaladamara.
Mal. Dudap. *Hind.* Pangra, Panjira, Mandara.

A deciduous tree, common in the coast forests of South India, often planted for ornament. The bark is used for dyeing and tanning. The dried red flowers yeild a red dye when boiled. (Watt's Dy.)

41. Eugenia Jambolana, *Lam.* Black Plum. N.O. Myrtaceæ.

Tam. Chambu, Kottainagam, Kottainaval, Nāgai, Nāval, Takkōlam.
Tel. Jambuvu, Nērēdu, Rāchanēredu, Peddanēredu.
Kan. Nērale, Jambunērale. *Mal.* Naga, Nāval, Perinnāval.
Hind. Jāman, Jam, Jamun, Phalinda, Phalanda, Jamniphatāni, Pharenda, Phaunda, Paiman.

An evergreen tree, common throughout South India, chiefly along river banks ; often cultivated for its fruit. The bark is used for dyeing and tanning. It is also used for colouring fishing nets. It is said that a decoction of the bark is used to precipitate indigo from the infusion obtained from the plant. (Watt's Dy.)

42. Garcinia Morella, *Desr.* Gamboge. N.O. Guttiferæ.

Tam. Chōlaippuli, Irēvalchinni, Makki.
Tel. Pasupuvanne, Rēvalchinni.
Kan. Aradala, Arasinagurche, Dēvanahuli, Jārige.
Mal. Karukkampuli, Makki, Pinarppuli, Pulinchakka, Valogam.
Hind. Tamāl.

An evergreen tree, common on the Western Ghats. The gum-resin which exudes from the trunk forms the gamboge which is employed by Burmans for dying silk a yellow colour. It is also used as a pigment. The rind of the fruit is said to be useful as a tanning material. (Watt's Dy.)

43. Hymenodictyon excelsum, *Wall.* N.O. Rubiaceæ.

Tam. Malaitanakku, Ilaimērgāy, Nāykkadambu, Vellaikadambu, Vilāri.
Tel. Bandāru, Būrija, Duvvudippa, Manuvabillu, Mokatu.
Kan. Battaga, Dōli, Gandele.
Mal. Ittiyila, Malankalli, Nīchakatampa, Perantoli, Vallāri.
Hind. Bhaulan, Bhalena, Bhamīna, Dhaulī, Kūkūrkat, Bhūrkar, Phaldu, Bholīar, Potūr, Bandārū, Phargur.

A large tree of the deciduous forests of South India. The leaves are said to be used as a dyestuff and the bark as a tanning material. (Watt's Dy.)

44. Indigofera tinctoria, *Linn.* Indigo. N. O. Leguminosæ.

Tam. Nīlam. *Tel.* Nīlimandu.
Kan. Nīli. *Mal.* Nīlam.
Hind. Nīl.

A small shrub, cultivated in various parts of South India. The leaves yield the natural indigo of commerce, which forms one of the most important dyestuffs. The dye is prepared either from the

green leaves or from the dry leaves. The mode of preparing is as follows :—

The leaves are packed in a masonry vat and pressed down by means of heavy beams attached to the sides of the vats. Clear water is then added mostly by means of the ordinary country picotah from a well situated near by. The leaves are then allowed to soak for a day in the case of green leaves and for six hours in the case of dry leaves. After fermentation a dark scum rises to the surface which later on subsides as the scum reaches a copper colour. Now the liquor is run off into a lower or beating vat where it is churned for about three hours with wooden boards and then the liquid is allowed to stand until the precipitated indigo has settled leaving a clear liquid at the top. This liquid is drawn off and the thick residium is placed in a boiler and boiled until all scum is removed when the indigo becomes stiff. It is then strained through a clean cloth, pressed and cut into cubes. (Dr. Watt's Comm. Prods.)

45. Lawsonia alba, *Lamk.* Henna Plant, Camphire, Cypress Shrub. N.O. Lythraceæ.

Tam. Aivanam, Kērandam, Marudōnri, Pīdai, Mayilainandi.
Tel. Gōranta Gōrata, Krommi, Kuravakamu, Maida, Pacha-eddagōranta.
Kan. Gōrantā, Madaranga. *Mal.* Mayilānchil, Pontalāsi.
Hind. Mehudi, Mhindī, Hēna.

A deciduous shrub, common in the Carnatic, abundant in a cultivated state. The leaves contain a dyestuff. The powdered leaves are beaten up with catechu into a paste and used for dyeing the nails and skin a reddish-orange. A decoction of the leaves is occasionally used for dying cloth. (Dr. Watt's Comm. Prods.)

46. Mallotus philippinensis, *Muell.* Monkey Face Tree. N.O. Euphorbiaceæ.

Tam. Kapila, Kapli, Manchanai. *Tel.* Sinduri, Kunkuma, Tunga.
Kan. Hulichellu, Kapile, Kēsari, Kunkume.
Mal. Kapila, Kuramatukka, Mannana.
Hind. Kambilā, Kamūd, Kamalā, Kamila, Kamelā, Rūm, Rūlu Kambhal.

A small tree, common all over South India. The red mealy powder of the fruit capsules yield the kamelā dye. It is used chiefly for silk to which it imparts a fine yellow colour. To collect the powder the ripe capsules are gathered and rubbed together or shaken in bags till the farina separates. In some places the fruits are simply rubbed between the palms of the hands or are kneaded with the feet on the ground. (Dr. Watts Comm. Prods.) The bark is used for tanning. (Watt's Dy.)

47. Memecylon edule, *Roxb.* Ironwood Tree. N. O. Melastomaceæ.

Tam. Alli, Anchani, Cirugāchā, Kāchai, Kācha, Kāyā, Pungāli, Pūvai.
Tel. Alli, Manchiyalli, Peddalli, Midalli, Korrēnyi.
Kan. Alamaru, Alle, Gandukēpalā, Neymāru, Nibidalle, Ūdidalle.
Mal. Ānakkāyāvu, Kāḷāyam, Kanila, Kānnāvu, Kāsavu, Netunchetti.

A small tree, common on the Eastern Ghats. The leaves are used as a dyestuff and they yield an yellow dye. Along with myrobalans and sappan wood they give a deep red tinge much used for dyeing grass mats and occasionally for cloth. The flowers also produce an yellow dye. (Watt's Dy.)

48. Michelia champaca, *Linn.* Champak. N.O. Magnoliaceæ.

Tam. Chambagam, Amariyam, Vandunārmalar,
Tel. Chāmpēyamu, Chempakamu. Gandhaphali, Hēmangamu, Hēmapushpamu, Kanchanamu, Sampega, Sampangi,
Kan. Champaka, Kōlasampiga, Sampige, Sampay.
Mal. Chempakam. *Hind.* Champā, Champac, Champaca.

A large evergreen tree of the Nilgiris, the Western Ghats and the Northern Circars, often planted near temples. The flowers when boiled yield an yellow dye sometimes used as a base for other colours. (Dr. Watt's Dy.)

49. Morinda citrifolia, *Linn.* Indian Mulberry, Togari wood of Madras. N.O. Rubiaceæ.

Tam. Chēgal, Manchadbāvattai, Manchanārri, Nunā.
Tel. Maddi, Mogali, Molugu, Togaru.
Kan. Haladipāvate, Maddi, Tagache.
Mal. Karrapītalavam, Mannanārri, Mannapāvatta.
Hind. Al, Āch, Ak, Barraal.

A deciduous tree, common all over South India. The root-bark yields a scarlet dye used for dyeing handkerchiefs, turbans, etc. The wood also contains a co'ouring matter, but this is not generally utilized. (Dr. Watt's Dy.)

50. Nyctanthes arbor-tristis, *Linn.* N.O. Oleaceæ.

Tam. Chūdam, Manchadbū, Parichādum, Pavalamalligai, Tirā.
Tel. Pagadamalle, Pārijātamu, Sēpāli, Svētasurasa.
Kan. Gōli, Harisryngi, Pārijata. *Mal.* Mannappū, Parijātakam.
Hind. Hār, Sihāru, Harsinghār, Saherwa, Seoli, Nibari.

An evergreen tree of the Northern Circars and the Deccan, often cultivated in gardens for its fragrant flowers. The orange coloured corolla tubes yield an orange or golden dye which is not durable. The dye is however used for silk in combination with turmeric.

The bark is said to be used for tanning. (Watt's Dy.)

51. Odina Wodier, *Roxb.* N.O. Anacardiaceæ.

Tam. Ānaikkārai, Appariya, Odi, Udi.
Tel. Gumpena, Dhumpāri, Vaddi, Oddi.
Kan. Agasryngi, Dhumpāri, Godde, Haleberi, Kuratige, Pūncle, Sinti, Udi.
Mal. Anakkāram, Kālāyasam, Uti.
Hind. Jingam, Kiamil, Kimūl, Kamlāi, Kashmala, Ginyan, Jhingan, Mowen, Mohin, Moyen.

A deciduous tree of the dry forests of South India, often planted as an avenue tree. The bark of the tree forms a dyeing (brownish red) and tanning material. (Watt's Dy.)

52. Oldenlandia umbellata, *Linn.* Chay Root. N.O. Rubiaceæ.

Tam. Imbural, Sayawer. *Tel.* Chiriveru.
Hind. Chirval.

A small plant which occurs in sandy soils all over South India. The root-bark known as chay root yields a red dye. With alum as a mordant it is used for dyeing handkerchiefs. (Watt's Dy.)

53. Oroxylum indicum, *Vent.* N.O. Bignoniaceæ.

Tam. Arandai, Pālaiyudaichi, Pana, Achi, Vangam. *Tel.* Dundilamu, Mandukaparnamu, Mokkavēpa, Pampena, Peddakatti, Sukanāsamu.
Kan. Bāgi, Hīre, Mokka, Nalā, Sonepatte. *Mal.* Aralu, Arantal, Palakpāyani, Veluttapātiri, Chorikonna.
Hind. Ullu, Artu, Kharkath, Pharkath, Sanna, Shyona.

A small tree of the deciduous forests of South India. The bark and fruits are used as a mordant in dyeing and tanning. (Watt's Dy.)

54. Phyllanthus Emblica, *Linn.* Emblic Myrobalan. N.O. Euphorbiaceæ.

Tam. Kāttunelli, Nelli, Tāttiri, Toppuneli, Amalagam, Chirōttam. *Tel.* Amalakamu, Nelli, Pullayusirika, Triphalamu, Usirika, Usirikāya Peddavusirika.
Kan. Nelli, āmalaka dādi. *Mal.* Āmalakam, Nelli.
Hind. Aoulā, Ānuli, Āmlaki, Āungra, Ānward, Ānvulā, Ānolā, Dāula, Amla, Aura.

A tree common in the deciduous forests of South India. The fruits yield a blackish dye which is often used along with salts of iron or with barks of other trees.

The fruits, leaves and bark all contain tannin and they are used for tanning purposes all over South India. (Watt's Dy.)

55. Psidium guava, *Linn.* Guava. N.O. Myrtaceæ.

Tam. Koyyā. *Tel.* Goyya, Jāma.
Kan. Gova, Jāma, Sibi. *Mal.* Koyyā, Pēra.
Hind. Arurut, Amrūd, Am.

A small evergreen American tree, now cultivated and occasionally found semi-wild. The leaves and bark are used for dyeing, while the leaves alone are occasionally employed for tanning. (Watt's Dy.)

56. Pterocarpus santalinus, *Linn.* Red Sanders, Red Sandalwood. N.O. Leguminosæ.

Tam. Chenchandanam, Chandanavēngai. *Tel.* Errachandanamu, Kuchandanamer, Raktachandanamu.
Kan. Kempugandha, Patrānga, Raktachandana. *Mal.* Chenchandanam, Uruttuchandanam.
Hind. Ruktochandan, Undum, Lālchandan, Ragatchandan.

A tree of North Arcot, Cuddapah and Nellore districts, chiefly found on the Seshachellams, the Lankamalais and the Veligondas. The wood contains a red colouring matter which is used as a pigment for marking idols and the forehead in ceremonies and occasionally for dyeing cloth. In Europe it is said to be used for dyeing leather and staining wood. (Watt's Dy.)

57. Randia dumetorum, *Lamk.* N.O. Rubiaceæ.

Tam. Chirattagālgaam, Kadudam, Kālagalam, Madukkārai, Pungārai. *Tel.* Chinnamanga, Madanamu, Mandā, Rangāra, Mranga.
Kan. Aremādalu, Kāre. *Mal.* Kāra, Karalikkaya, Kāttunāranna.
Hind. Maniphal, Magūl, Karhar, Rain, Arar, Maīnturi manneal.

A deciduous shrub, common all over South India. The fruits are said to be used as a colour intensifier in calico printing and in China for producing an yellow dye. (Watt's Dy.)

58. Rhizophora mucronata, *Lam.* Mangrove. N.O. Rhizophoreæ.

Tam. Chorippinnai, Kandal, Peykkandal. *Tel.* Adaviponna, Manchiponna Uppuponna.
Kan. Kandale. *Mal.* Panachikantal, Pikantal, Venkantal.

A small evergreen tree of the muddy shores and tidal creeks of South India. The bark is used for tanning; it is also said to yield a chocolate dye. (Watt's Dy.)

59. Rubia cordifolia, *Linn.* Indian Madder. N.O. Rubiaceæ.

Tam. Mangitte, Sawilcodie. *Tel.* Mandastie, Tāmravalle.
Kan. Manjashta. *Mal.* Manchetti.
Hind. Manjīt, Majīth.

A herbaceous creeper, found throughout the hilly parts of South India. The plant yields a red dye and the root is much used for dyeing coarse cloths and stuffs red. (Drury.)

60. Salix tetrasperma, *Roxb.* N.O. Salicinæ.

Tam. Atrupālai. *Tel.* Ētipala.
Kan. Nirunvanji. *Mal.* Arrupāla.
Hind. Bed, Bent, Baishi, Bet.

A deciduous tree found all over South India, chiefly on river banks and moist places. The bark is said to be used for tanning. (Watt's Dy.)

61. Semecarpus anacardium, *Linn.* The Marking Nut. N.O. Anacardiaceæ.

Tam. Sherangkottai. *Kan.* Geru bija.
Tel. Jeedi vittulu. *Hind.* Bhilawa, Bheyla.

A common deciduous tree distributed all over tropical India. The fruits are used with or without alum as a dye for cotton cloths. The pericarp contains an astringent principle which is used throughout South India as a substitute for marking ink. The dye gives a black colour to the cloth. (Watt's Dy.)

62. Soymida febrifuga, *Juss.* Indian Red wood, Bastard cedar. N.O. Meliaceæ.

Tam. Cheru, Chōmadanam, Chōmbu, Chūmi, Churakkalli, Vandu. *Tel.* Chēvamānu, Sēmi, Sōmida, Sōmiti, Sūmi.
Kan. Kalgarige, Sōme, Sīvami. *Hind.* Rohun, Rohunna, Rakatrohan.

A large deciduous tree of the dry forests of South India. The bark forms a dyeing and tanning material. In Mysore it is often used for dyeing cotton a dirty brown colour. (Watt's Dy.)

63. Tachardia lacca, *Kerr.* N.O. Rhynchota.

Lac is a resinous encrustation produced by an insect which sucks the iuice of plants and changes this juice into resin which completely surrounds it. This insect belongs to a group of insects called Coccidæ, commonly known as scale insects. It is found growing naturally on a large number of trees but is especially grown on the Kusumb, Pāvā, Pumarum, Posuku (Schleichera trijuga, *Willd.*); Palas, Porasan, Moduga, Muttaga-a-Mara (Butea frondosa); Ber; Elandap, Regu, Yalachi (Zizyphus Jujuba, Lam.); Peepal, Arasa, Aswartham (Ficus religiosa, *Linn.*); Siris, Vaghe (Albizzia lebbek, *Benth.*); and Babul, Bahbula, Tuma (Acacia arabica, *Willd.*).

The cultivation of lac is a very old industry and was known to the ancients. In the beginning it was much collected for the lac dye it contained. Later on, when the use of resin became known, the demand for lac dye began to go down until it was completely displaced by the coaltar colours. Now-a-days the dye has to be thrown away and the manufacturers require a stuff which is free from the colouring matter. For a long time the industry had been in the hands of local people who rented the trees, removed the lac-bearing branches at the proper time, scraped the resin, washed it in water and utilised the resin for making toys and bangles. But now it has been found possible to cultivate the lac insect artificially on a number of trees.

So far as is known no lac is grown in the Madras Presidency. The largest quantity of lac is obtained from the Central Provinces. Next to the Central Provinces, certain districts in Bengal produce fairly large quantities of lac. Lac is also grown to a lesser extent in Assam, United Provinces and Punjab.

For further information regarding the method of cultivating lac, reference may be made to Dr. Watt's Dictionary of Economic Products, and Pusa Bulletin No. 28. The lac is scraped from the twigs and washed. By washing stick lac with water two things are obtained: (1) pure resin which is commercially known as seed lac and used for the manufacture of shellac, (2) lac dye.

Lac dye.—This is used for the manufacture of Altas or balls of cotton wool soaked in concentrated lac dye and used by Hindu women for colouring the soles of their feet. The lac dye is also a good manure and can be used as a substitute for oilcake manures. It can also be used for dyeing eri silk. The cloth, if previously mordanted with alum, takes a beautiful red colour.

The shellac is put to great many uses. The goldsmiths in India use it for filling ornaments, for making bangles, toys, and marbles. Used for fixing handles to swords, etc. Also used for making brackets and sealingwax sticks. Shellac is used in foreign countries for the manufacture of gramaphone records, sealing wax sticks, lithographic inks, varnishes, etc. (Dr. Watt's Dy. and Pusa Bulletin No. 28.)

64. **Tamarix gallica**, *Linn.* Tamarisk. N.O. Tamariscineæ.

Tam. Atruchavukku, Kōta-Chavukku, Shiruchavukku. *Tel.* Ērusaru, Pakke, Prakke.

Mal. Jhāvukaru. *Hind.* Jhāv.

A shrub or small tree found especially along rivers and near the sea-coast in South India. The galls on the twigs are largely used for dyeing and tanning. (Watt's Dy.)

65 **Terminalia tomentosa**, *Bedd.* N.O. Combretaceæ.

Tam. Kalimarudu, Karumarudu, Karuppumarudu, Marudu, Kagubaru, Aruchanaru. *Tel.* Maddi, Nallamaddi, Nēlamādu, Irumaddi.

Kan. Bhudri, Hebhuluve, Karimatti, Kudurekivigena, Sōhonne, Matti, Shadlers, Banapu. *Mal.* Karimarutu, Marutu, Tēmpāvu.

Hind. Saj, Sein, Āran, Āssain, Āsna, Sadri, Sain, Ain.

A large tree, common all over South India; grows to a large size on the Ānamalais and the Nallamalais. The bark yields a brown or buff colouring matter. The fruit is used for tanning. (Watt's Dy.)

66. **Thespesia populnea**, *Corr.* Portia Tree, Tulip Tree. N.O. Malvaceæ.

Tam. Pūvarasu, Pūpparutti, Kallāl. *Tel.* Gangarāvi, Gangarēni.

Kan. Bangāli, bugari, Gandarali, Hūvarasi, Arasi, Jōgiyarale, Jōgi, Jōgiyattasa. *Mal.* Chīlānti, Kaillāl, Pūpparutti, Pūvarachu.

Hind. Parsipu, Pīpal, Paraspīpal, Porushbhendi.

An evergreen tree of the sea coast forests of South India, often cultivated as an avenue tree in towns near the sea coast. The fruits and flowers are said to yield an yellow dye which is not much used. (Watt's Dy.)

67. **Toddalia aculeata**, *Pers.* N.O. Rutaceæ.

Tam. Kattumilagu, Kichilikkaranai, Milagaranai, Mullukkaranai. *Tel.* Kondakasinda, Kondamirepu, Mirapakāndra, Mullukōrinda, Vanakasinda.

Kan. Kāduhākukāre, Kādumenasu, Kaypele Mullumācige, Mācimullu, Kādukāre. *Mal.* Kākkattutali, Kārumullu, Rāttukari, Mulaku, Mulakutānni, Tutali.

Hind. Kanj, Dahan, Janglīkālimirchī.

A large climbing shrub, common all over South India. The root bark contains an yellow dye which is extracted by the help of water. (Watt's Dy.)

68. **Ventilago madraspatana,** *Gærtn.* N.O. Rhamneæ.

Tam. Churul, Churulbattaikodi, Pappili, Vēmbādan.
Tel. Errachiratalativva, Errasurugudu, Pūtika, Surabi, Suralatige, Surugudu.
Kan. Haruge, Kabbilu, Malamaitra, Pappali.
Hind. Pitti.

A large climbing shrub of the drier forests of South India. The root bark contains a valuable dye. It yields a beautiful chocolate colour and with galls a black dye. The dye is largely used for cotton cloth. (Watt's Dy.)

69. **Wrightia tinctoria,** *Br.* N.O. Apocynaceæ.

Tam. Vedbālai, Vēppālai, Nilambalai.
Tel. Tedlapāla, Rēpāla, Pālunīli.
Kan. Beppāle, kādunīle.
Mal. Ayyappāla, Icha, Irurpāla.
Hind. Indarjon, Mithaindarjon.

A tree, common all over South India. The leaves yield a kind of indigo. The seeds are said to be used as an adjunct to other materials in dyeing. (Watt's Dy.)

70. **Zizyphus xylopyrus,** *Willd.* N.O. Rhamneæ.

Tam. Kottai, Kottaiyilandi, Mulluduppai.
Tel. Gotti, Rēgotti.
Kan. Chotte, Gochi, Kottemullu.
Mal Chōttukotta, Kotta.
Hind. Katber, Bēri, Goti, Golāha, Kakor, Chittania, Sitābēr, Ghōut.

A small tree, common in the deciduous forests of South India. The bark and fruits are used as tanning materials (Watt's Dy.)

GUMS AND RESINS.

1. **Acacia arabica,** *Willd.* Babul. N.O. Mimoseæ.

Tam. Karuvel.
Tel. Nallatumma, Barburamu, Tummachettu.
Mal. Karu-velkam.

A tree found all over Southern India and Bengal, especially on the bunds of rivers, tanks, lakes, paddy fields, etc. The gum is obtained by making incisions in the bark and the sap running out hardens into lumps of various sizes and shapes. The exudation takes place in March, April and May and each tree yields about 2 lb. a year. The gum occurs in the form of broken and irregular tears agglutinated, each tear being half an inch size and of a pale straw colour to red, brown or even black.

The yield increases proportionately to the age of the tree but the quality becomes more and more inferior in the older trees. Indian gum arabic is of great industrial value in calico printing and other industries where a mucilage is necessary and in which the peculiar properties of this gum are recognized as specially suitable. Also employed as an ingredient in whitewash and in paints used for wall distempering. Added to certain mortars and to paints that are used for clay toys.

Also used as a famine food.

For its medicinal value. See Drugs. (Watt's Comm. Prods.)

2. Acacia catechu, *Willd.* N.O. Mimoseæ.

Tam. Wodalai pisin. *Tel.* Podala banka.
Kan. Kagali or Tare banke.

A tree distributed throughout India. It has three varieties and the one that grows in the Madras Presidency is the variety Sundra. Found in Coimbatore, Deccan, Kanara and Konkan. The gum is of a pale yellow colour and occurs in tears of one inch in diameter. The gum is soluble in water, and sweet to the taste. A better substitute for the Tree Gum Arabic than is babul gum. This is probably the best of the South Indian Gums. (Dr. Watt's Comm. Prods.)

3. Acacia Farnesiana, *Willd.* N.O. Mimoseæ.

Tam. Piy-velam. *Tel.* Piyi-tumma, Kampu-tumma, Nagatumma.
Mal. Pivelam.

A common tree all over South India. The gum is not of great commercial value. (Dr. Watt's Comm. Prods.)

4. Acacia ferruginea, *D.C.* N.O. Mimoseæ.

Tam. Shimai Vel Velam pisin. *Tel.* Wunibanka.

A tree, common on the Coromandel Coast, Courtallum and Northern Circars. The gum is nearly as good as gum arabic, and is used often as a substitute for it in industries. (Watt's Dy.)

5. Acacia Sundra, *D.C.* N.O. Mimoseæ.

Tam. Karungali pisin. *Tel.* Nallasandra banka.
Kan. Kempu Kairada or Banni-banke.

A tree common in Coimbatore, Kanara, Konkan and Deccan. Only a variety of Acacia catechu. See Acacia catechu and Resins.

6. Ailanthus malabarica, *Dec.* N.O. Simarubeæ.

Tam. Mattipal pisin. *Tel.* Maddipal banka.
Kan. Matti banke.

A tree, common in Malabar and Travancore. This pisin is obtained by making incisions in the bark. The resin which exudes hardens into a little form. It is opaque, dark brown to grey in colour, plastic and has an agreeable smell. It is used as an incense and as a medicine especially in dysentery. (Dr. Watt's Dy.)

7. Albizzia amara, *Boirin.* N.O. Leguminosæ.

Tam. Thurinji pisin or Shikaram pisin.
Tel. Nallarenga banka or Sikareni banka.
Kan. Bilkambi banke. *Mal.* Oosali pisin.

A moderate-sized deciduous tree, common in South India. The gum is good but not much is known about it. (Dr. Watt's Dy.)

8 & 9. **Albizzia Lebbek**, *Benth.* The Sirio Gum. N.O. Leguminosæ.

Tam. Vaghai pisin. *Tel.* Dirsana banka.

Kan. Baghi banke.

A large spreading beautiful tree, both wild and cultivated. Found in the Himalayan tracts, South India and Burma ascending to 5,000 feet in altitude. Grown on the road sides for shade in Madras. The gum is not soluble in water. It forms a jelly with water. Used in calico printing and in the preparation of gold and silver leaf cloths. Nearly as good as gum arabic. (Watt's Dy.)

10. **Anacardium occidentale**, *Linn.* The Cashew nut. N.O. Anacardiaceæ.

Tam. Munthiri pisin. *Tel.* Muntha mamidi banka.

A tree, common in the hot districts of South India and Malabar. The gum occurs in large stalactitic pieces; yellow or reddish and only slightly soluble in water. Obnoxious to insects. (Cooke Rep. on Gums.)

11. **Anogeissus latifolia**, *Wall.* N.O. Combretaceæ.

Tam. Veckali pisin. *Tel.* Chirumanu banka.

Kan. Dinduga banke.

A large deciduous tree, common in South India. It ascends up to 3,000 feet in altitude. The gum is used in calico printing and has been suggested as likely to be useful to dyers in England. Very largely exported from India. (Watt's Comm. Prods.)

12. **Areca catechu**, *Linn.* N.O. Palmæ.

Tam. Kamugu pisin.

This tree is cultivated exclusively within the moist tropical tracts that fringe the coast of this Presidency and Malabar and Travancore and Mysore. Its cultivation is confined practically to a belt of land that does not extend inland for more than 250 miles. It rarely ascends to altitudes of 3,000 feet and does not grow even in littoral areas where the duration of the dry hot months exceeds or equals the monsoons. Often to be met with as a garden plant in Madras and elsewhere. In Malabar in suitable places, grown along with Mango, Piper, Coconut, etc., in the same garden. The gum is not very much known.

13. **Balsamodendron Mukul**, *Hook.* Gum Gugal. N.O. Burseraceæ.

Tam. and *Tel.* Maisachi.

A native of Western India and Rajaputana. A small spiny tree of four to six feet. The gum is used as a medicine and an incense. Brittle. Red, yellowish or brown, transparent and has a pleasant odour. Soluble in potash and contains resin, gum bassorine and a volatile oil. In native medicine it is used as a carminative demulcent and alterative. Considered to be very useful in leprosy, rheumatism and syphilis. (Watt's Dy.)

14. Bassia longifolia, *Linn.* N.O. Sapotaceæ.

Tam. Iluppa maram. *Tel.* Ippa, Ippee.
Mal. Ellupi.

A tree that is cultivated on the Coromandel Coast and Malabar. The gum is obtained by making deep incisions around the tree. The gum is only of an inferior value. (Watt's Dy.)

15 & 16. Bombax malabaricum, *D.C.* The Silk Cotton Tree. N.O. Malvaceæ.

Tam. and *Mal.* Mulilabam pisin. *Tel.* Mundla booraga banka.
Kan. Mullu burage banke.

A hot deciduous tree, common throughout the hotter forests of India. The gum is dark brown and is sold in the bazaars under the name of Moch-ras. Incisions in the healthy plant do not cause the gum to flow. This flows from portions of the bark that have been injured by decay or insects. Collected from March to June. A valuable aphrodisiac and possesses also astringent properties and is used in dysentery, diarrhœa, etc. (Watt's Comm. Prods.)

17. Borassus flabellifer, *Linn.* N.O. Palmæ.

Tam. Panai maram. *Tel.* Potu tati (the male tree), tati chettu (the female tree.)
Kan. Pane-mara. *Mal.* Pana.

A tall tree 30 to 100 feet with a crown of fan-shaped leaves at the top. Found in sandy places in South India, especially in Malabar and Travancore. The gum is black and has a black shining fracture. Not of very great value.

18 & 19. Boswellia serrata, *Roxb.* N.O. Burseraceæ.

Tam. and *Tel.* Parangi sambarani.

A moderate-sized gregarious tree of the intermediate northern and southern dry zones of India. The gum exudes only on injury to the tree. It occurs as a transparent golden yellow semi-fluid substance which slowly hardens. Collected twice in the year in Punjab—in June and October from incisions made in March. Slightly aromatic, pungent and has a balsamic odour. Used as food in Northern India. Also a useful medicine in rheumatism and nervous diseases and is used as an ingredient in some ointments In Gujerat it is burnt as an incense. (Dr. Watt's Comm. Prods.)

20. Buchanania latifolia, *Roxb.* N.O. Anacardiaceæ.

Tam. Katura pisin. *Tel.* Chara banke.

A middle-sized tree, met with in the dry forests throughout India and ascending in the Sub-Himalaya tract to 3,000 feet. The gum exudes from wounds in the stem and is more than half soluble in water. It has adhesive properties like the inferior gum arabic. In United Provinces it is used in printing cloth and in Berar it is employed in dyeing. The gum is not much collected. (Dr. Watt's Comm. Prods.)

21. Canarium strictum, *Roxb.* N.O. Burseraceæ.

Tam. Karapu kongilium. *Kan.* Manda dh'up, raldh'up.
Mal. Thelli.

It is a very tall and large deciduous tree of Western and Southern India from the Konkan Southwards. When in young foliage it is crimson and is therefore very conspicuous on the Ghats. The resin is obtained in the following manner. Vertical cuts are made on the bark and a mass of brushwood fired around the base of the trunk. This causes the resin to flow during the months of April to November for ten years. This is collected in January and taken to the market.

It is employed in the manufacture of a bottling wax or for varnish, etc. In medicine it is used as a substitute for Burgundy pitch in the manufacture of plasters. (Dr. Watt's Comm. Prods.).

22. Chloroxylon Swietenia, *D.C.* Indian Satin Wood. N.O. Meliaceæ.

Tam. Vummai purasam pisin. *Tel.* Bilu banka.

It is a tree, distributed in the Circars. The gum is amber coloured and soluble in water. It is in irregular and agglutinated tears which are very variable in size. Not much is known about the uses of this gum. (Cooke Rep. on Gums.)

23. Cochlospermum gossypium, *D.C.* The White silk Cotton tree. N.O. Bixineæ.

Tam. Tanakupisin. *Tel.* Kondagogu banka.

It is a small naked tree, common in the Deccan. This is a semi-transparent white gum in striated pieces very much twisted and contorted. It is insoluble in cold water but forms a paste. It is used in the trade of shoe making. (Dr. Watt's Dy.)

24. Cocos nucifera, *Linn.* The Coconut Palm. N.O. Palmæ.

Tam. Tennai pisin. *Tel.* Tenkaya chettubanka.

This is a very familiar tree that it needs no description. It is a tall palm growing all along the Coromandel Coast and Malabar. The gum is not of much value. It is obtained only in small quantities.

25. Combretum ovalifolium, *Roxb.* N.O. Combretaceæ.

It is a common climber in the Deccan and eaten by buffaloes. The plant yields a gum of inferior quality.

26. Damara australis or **Agathis dammara**, *Rich.* N.O. Coniferæ.

It is a large tree of the Malayan and Philippine Islands. It yields dammar, a resin largely used in varnish making. (Cooke Rep. on Gums.)

27. Elædendron glaucum, *Pers.* N.O. Celastrineæ.

Tam. Karkoa or Irguli pisin. *Tel.* Nirija banka.

A tree common throughout India. It is found in deciduous forests in Deccan, Carnatic, Circars and Western Ghats. The tree yields a small amount of gum of ordinary value. (Dr. Watt's Dy.)

28. Eucalyptus globulus, *Labill.* The Blue Gum. N.O. Myrtaceæ.

Tam. Kurpoora marappisin.

A native of Australia and a remarkably tall and strong tree. It is cultivated on the Nilgiris for its oil. It has become adapted to the climate of these hills, namely, Nilgiris and Palnis. The bark exudes the blue gum. The gum is a good substitute for the kino gum of European Materia Medica. (Dr. Watt's Dy.)

29. Euphorbia antiquorum, *Linn.* N.O. Euphorbiaceæ.

Tam. Sadurakalli pisin. *Tel.* Bonta Jummudu banka.

It is a small tree, common all over the dry places in South India, especially in Madura, Rāmnād, and Tinnevelly districts. It is often used as a hedge plant. The gum of this plant has not been studied yet very well.

30. Euphorbia trigona, *Haworth.* N.O. Euphorbiaceæ.

Tel. Kalthi mandu.

It is an erect glabrous shrub, inhabiting the dry rocky hills of the Deccan. The latex or the milky juice is used for fixing knives, etc., into handles. (Dr. Watt's Dy.)

31. Feronia elephantum, *Correa.* Wood Apple. N.O. Rutaceæ.

Tam. Vilang pisin. *Tel.* Velaga banka.

Kan. Belatha banke.

It is a tree with irregular branching and common on the Coromandel and Western Coasts. The gum is used by dyers and painters especially the miniature and chintz painters. It is also used in making ink and certain varnishes and by the bricklayers in preparing a fine kind of whitewash.

The gum is yielded in large qualities and is nearly fully soluble in water. It occurs in irregular semi-transparent reddish brown tears (Cooke Rep. on Gums.)

32 & 33. Ferluia alliaceæ, *Boiss.* Asafœtida. N.O. Umbelliferæ.

Tam. Perungayam. *Tel.* Inguva.
Hind. Hing. *Kan.* Hinguve.

A herb which grows to a height of 2 to 4 feet. It is found wild in Eastern Persia and in Khorsan. It likes a stony arid soil and is found at an altitude of 7,000 feet. This plant is the chief source of the asafœtida used in India and known as hing. The gum-resin is obtained by wounding the upper part of the root from which a small quantity of gum-resin escapes and is collected. The living root is then sliced daily or once in 2 or 3 days with the exudation adhering to it till exhausted. The whole mass is then packed in a skin. It contains alternate layers of gum-resin and root. The gum-resin is carminative and antispasmodic and from time immemorial it has been held in great value by Indian doctors. (Dr. Watt's Comm. Prods.)

34. Ficus elastica, *Roxb.* N.O. Urticaceæ.

Beng. Bor attahbor. *Nep.* Lesu.

A gigantic evergreen tree with numerous aerial roots. A native of Northern India, growing on the outer hills of the Eastern Himalaya from Nepal eastwards rising to 3,000 feet. The gum is the source of caoutchouc or India rubber. The tree is tapped by means of slanting notches about 12 inches apart, made in the stem, aerial roots and roots. The milk is allowed to collect and coagulate in these places for 2 or 3 days. It is afterwards pulled out from each notch in a strip. Each tree bears tapping only once in three years. For further information see Rubber in the catalogue.

35. Garcinia Morella, *Desr.* The Gamboge Tree. N.O. Guttiferæ.

Tam. Makki, Ireval-chinnippal *Tel.* Reval chinnipal.

An evergreen tree, to be found in the forests of West Coast and Ceylon. The gamboge of medicine and the arts is obtained from this gum-resin. The tree tapped must be at least ten years old. From a height of about 10 feet from the ground, incisions are made on the trunk. This is done from June to October. The sap which exudes hardens and is afterwards scraped off. This gives the cake and granular gamboge. In Siam a different method of tapping and collecting is employed and we get the pipe gamboge. The gamboge is of a rich brown colour, dense and brittle and has a conchoidal fracture of a reddish yellow colour and tasteless at first and then acrid. Gamboge dissolves in ammonia and this solution produces yellow and red dyes with zinc, alumina and lime mordants.

In medicine it is used as a hydragogue and drastic cathartic and anthelmintic. (Dr. Watt's Comm. Prods.)

36. Gardenia gummifera, *Linn.* N.O. Rubiaceæ.

Tam. Kumbai, Dika-malli. *Tel.* Chinaka-ringuva.

A small tree, common in South India and Mysore. The gum-resin is exuded from wounds in the bark and also from the leaf buds. This is transparent and bright yellow in colour and pleasant to chew. It is used in the treatment of ulcers and to keep off flies and worms from ulcers, etc. (Dr. Watt's Dy.)

37 & 38. Gardenia lucida, *Roxb.* N.O. Rubiaceæ.

Tam. Kumbi. *Tel.* Tella-manga, Karinga.

Kan. Dikka banke.

A small deciduous tree, common in South India, especially in the circars. The gum is exuded by wounds in the bark or by the leaf buds. The sample 37 is from the Gōdāvari district. The gum is hard, opaque and olive green in colour and has an unpleasant smell. It is used in treating ulcers and to keep off flies and worms from ulcers in hospitals. (Dr. Watt's Dy.)

39. Garuga pinnata, *Roxb.* N.O. Burseraceæ.

Tam. Karuvembu pisin. *Tel.* Garuga banka.

Kan. Balage banke.

A large deciduous tree, distributed all over India in the deciduous forests. The gum is of an inferior quality.

40 & 41. Hardwickia pinnata, *Roxb.* Malabar Mahogany. N.O. Cæsalpineæ.

Tinnevelly. Kolaire. *Travancore.* Matayen samprani.
Mal. Shurali, kolla.

A very large tree, distributed in the South Travancore Ghats and South Kanara. To obtain this a deep notch is made in the heart of the tree and after a time the resin flows. In its composition and properties it resembles the copaiva balsam; it is nearly soluble in ammonia. The resin contains different resins in an essential oil and so it is an "oleo resin." From this an oil varnish is prepared and this is very good. The resin is also used in Indian medicine. (Cooke. Rep. on Gums.)

42. Hopea Wightiana, *Wall.* N.O. Dipterocarpeæ.

Kan. Kalbow, kiralboghi. *Travancore Hills.* Ilapongu.

It is a large tree, distributed in the forests of Western Coast, from the Konkan to Tinnevelly. Not much is known about this resin.

43. Odina Wodier, *Roxb.* N.O. Anacardiaceæ.

Tam. Uthayam pisin. *Tel.* Dumpini banka.
Kan. Shimli banke.

It is a large tree, common in Coromandel mountains, Madras, and Travancore. The gum is obtained by making shallow cuts all over the bark. The gum is brown, clear and brittle. It is used in calico printing and in paper sizing. It is also used by weavers in cloth printing. It is employed in whitewashing and in pasting. The gum is on the whole a very valuable one. (Dr. Watt's Dy.)

44. Pterocarpus marsupium, *Roxb.* The Indian Kino. N.O. Leguminosæ.

Tam. Vengai pisin. *Tel.* Yeggi banka.
Kan. Benga banke. *Mal.* Vennappasha.

A large deciduous tree, to be found in South India. The gum of this tree is officinal in the British Pharmacopæia. The manufacture of kino from the juice is done in North Malabar during the months of February and March when the tree is in full blossom. The tapping is done in the following way. A longitudinal cut is made with a knife through the bark of the tree down to the cambium about 1½ feet long and side cuts are made to lead into this. A bamboo tube is then fixed at the bottom of the main incision to catch the juice. The flow of the juice ceases in 24 hours. When several of these bamboo tubes are filled they are taken and thrown into a big vessel and boiled. During boiling the impurities which rise to the surface are skimmed off. When the liquid becomes sufficiently concentrated it is exposed to the sun in shallow vessels till dry enough to crumble to pieces. Each tree yields about 1½ lb. of juice. The kino is also useful as a tanning material. (Dr. Watt's Comm. Prods.)

45. Shorea robusta, *Gærtn. f.* The Sal Tree. N.O. Dipterocarpeæ.

Tel. Gugal.

A large gregarious tree, abundant in the forests of Northern Circars. When tapped the tree yields a resin in large quantities. The resin is whitish, aromatic and transparent. It is used to caulk boats and ships and as incense and in medicine. (Dr. Watt's Comm. Prods.)

46. Shorea Talura, *Roxb.* The Lac Tree. N.O. Dipterocarpeæ.

Tam. Talura, Talari. *Tel.* Jalari.
Kan. Jalaranda.

It is a large tree, found very common in South India, chiefly in the districts of Cuddapah, North Arcot, Anantapur, Wynaad, Malabar, Coimbatore and Madura. This is said to be used in medicine.

47. Soymida febrifuga, *Adr. Juss.* The Bastard Cedar. N.O. Meliaceæ.

Tam. Shunmarappisin. *Tel.* Sumi banka.
Kan. Suami banke.

It is a large deciduous tree, distributed in the dry forests of South India. It prefers low hills of laterite and Konkan and is often found together with satinwood. The gum occurs in large pieces and affords good muscilage. (Dr. Watt's Dy.)

48. Sterculia urens. *Roxb.* N.O. Sterculiaceæ.

Tam. Vellai boothalāi pisin. *Tel.* Tabsu banka.

A large deciduous tree, common in the dry hills of South India, Konkan and Kanara. The gum is used in medicine. It has been used in the Bombay hospitals as a substitute for tragacanth. (Dr. Watt's Comm. Prods.)

49. Stereospermum xylocarpum, *Wight.* N.O. Bignoniaceæ.

Tam. Vaden cari. *Kan.* Ghansing.
Mal. Edang korna.

A deciduous tree. This is common in the West Coast forests and Western Ghats. It is also common in Wynaad and Travancore up to 4,000 feet, Circars, Deccan and Carnatic. The resin is used in medicine. (Dr. Watt's Dy.)

50. Swietenia Mahogany, *Linn.* Mahogany gum. N.O. Meliaceæ.

A large evergreen tree and a native of Jamaica and America. Cultivated in a few places in India, such as at Kullar at the foot of the Nilgiris, Dehra Dun, etc. The seeds of the plant are winged. The gum is from a plant grown in the experimental gardens at Kullar, Nilgiris. There is not much known about the gum.

N.B.—There are two plants of this tree in the Museum compound.

51. Tectona grandis, *Linn.* The Teak. N.O. Verbenaceæ.

Tam. Tekku pisin. *Tel.* Tekku banka.
Mal. Tekku pasha.

It is a large deciduous tree, distributed in almost all the forests of South India and specially in the following places: (1) Wynad, (2) North Kanara, (3) Travancore and (4) The Anamalai Hills, (6) The Nallamalai hills of Kurnool and Cuddapah and (7) South Arcot and Mysore. By destructive distillation of the wood a black tar is produced and this is used for medicinal purposes in South India. (Dr. Watt's Comm. Prods.)

52. Vateria indica, *Linn.* The Piney Varnish. N.O. Dipterocarpeæ.

Tam. Piney maram, dhup maram, Valiay Kungiliam.
Tel. Dupada. *Kan.* Dupa maram, dhupa.
Mal. Payani, perum piney.

A large evergreen tree, common in the evergreen forests of the Western Ghats from Kanara to Travancore ascending to 4,000 feet, It is often planted as an avenue tree as it is one of the handsomest trees in the Presidency. The resin is of very great value. It is obtained by incising the bark and collecting the juice exuded. It occurs in three forms, compact piney, cellular piney and dark coloured piney—the differences being due to the different methods of collecting them and to the variations in the age of tree. It is only slightly soluble in alcohol and easily dissolves in turpentine and other drying oils and like copal, it is used for making varnishes. It has been recommended for use in pharmacy in place of the officinal pine resin. It is stated that in certain places it is mixed with coconut oil and rolled into candles. (Dr. Watt's. Comm. Prods.)

INDIA RUBBER, CAOUTCHOUC OR GUM ELASTIC.

Introduction.—Caoutchouc or rubber is obtained from the latex or milky juice, present in the tissues of a large variety of plants peculiar to Tropical and Sub-Tropical regions. It is supposed to have been discovered more than 400 years ago in South America. Rubber came to be of some importance when Macintosh about 1820 used it for manufacturing water proof garments. But it rose up in commercial estimation only when Mr. Thomas Hancock discovered that crude rubber when cut up, pressed and submitted to heat could be converted into a condition capable of being transferred to practically any shape or form. Later on about 1874, the method of vulcanising rubber, by heating and treating it with sulphur was found out. From this time onwards the demand for rubber streadily rose and we all know to what an extent it is being used to-day. To mention a few instances, it is used in the manufacture of cycle, carriage and motor tyres and electric appliances and in the recent wars, it was used in hundreds of ways.

1. *Sources, collection and manufacture of rubber.*—The best rubber in the market is what is known as the 'Para' rubber and this is produced by a plant known as *Hevea brasiliensis*, belonging to the natural order Euphorbiaceæ. The plant is a big tree growing to a height of about 60 feet and developing a trunk of 6 feet in diameter. The leaves are three foliate and elliptical lanceolate. The plant strikes a big tap root and produces an enormous quantity of branch roots. It grows at an elevation of 600 to 2,000 feet from the sea level. It likes an alluvial soil and requires a rainfall of about 60 to 70 inches and more and a temperature varying between 74°

and 95° F. It is best cultivated by seeds and occasionally by cuttings in bamboo pots in nurseries and transplanted afterwards. A space of about 40 or 60 feet is left between any two trees and they are all arranged in rows. All the methods employed in scientific cultivation are employed here also such as weeding, hoeing, etc. The plant is only rarely attacked by insects or fungi. Spraying with Bordeaux mixture or sulphur powder does good in these cases.

Tapping.—From about six feet from the ground V-shaped incisions are made in the bark with special knives called tapping knives. The latter are usally wedge-shaped. It must be remembered that the latex tubes run vertically between the cork and the wood and specially in the region of the cambium. So care must be taken not to injure the wood vessels by making deep incisions. At the bottom of each V incision a small aluminium cup of the size of a condensed milk tin or cigarette tin is hung, pressed to the bark. In this connection it must be said that only trees that have sufficiently developed a thick trunk are worthy of being tapped. Tapping is done early in the day and in the evening and once begun it will continue to about 16 to 18 days. Tapping is done once or twice a year and sometimes several times, these depending upon the localities, the vigour of the trees, etc.

The collected latex is strained through a wire or muslin gauze and poured into enamelled iron dishes of about 2 inches deep. Here they are exposed to the atmosphere and allowed to coagulate or the rubber in them is made to coagulate by adding to the latex some acid or alkali. Among acids sulphuric, and acetic, are commonly used and among alkalies alum is employed. The coagulated rubber is washed and pressed to get out the moisture in it. The pressed rubber discs are allowed to dry on shelves. (W. H. Johnson.)

In South India Hevea Brasiliensis is being cultivated in Travancore, Cochin, Malabar, Coorg, Anamalais, Shevaroys, Nilgiris and Mysore. The samples exhibited are from a rubber estate in Travancore.

2. *India Rubber.*—The second source by which rubber is obtained is from the tree *Ficus elastica* belonging to the natural order Urticaceæ. The specimen exhibited is from the experimental gardens, Kullar, Nilgiris.

Sources, collection and manufacture of India Rubber.—In India, Ficus elastica thrives well at the foot of the mountains of North India ; beginning at the borders of Nepaul, through Darjeeling, Sikkim, Bhotan and the mountain ranges north of Assam, Sylhet and Burma. It was discovered in Sylhet through the researches of Dr. Roxburg in 1810 and soon afterwards the material was introduced into England as rubber and thus commenced the industry of cultivating Ficus elastica and manufacturing India rubber goods.

The plant is best reared from seeds. It requires a well drained land and a hot steamy climate such as is obtained in the forests of North-East India. It grows on any kind of soil and of course becomes very luxurious in growth when grown in well-manured and properly drained soil. It requires a rainfall of about 70 inches, evenly spread all over the year. It never thrives well in places subjected to long droughts during the year. The plant puts forth a number of aerial roots and its base roots are all surface feeders. The plant grows as an epiphyte in its natural condition and assumes a large form and produces a massive foliage towering up to the skies. Hence in cultivating it, care must be taken to give it plenty of light and air.

Tapping.—This is conducted more or less in the same manner as in the case of Hevea brasiliensis. Sufficiently aged trees are marked for tapping. The same wedge shaped instrument is used and tapping is done on the trunk and branches. V-shaped incisions are made and care is taken not to make them too deep so as to injure the wood vessels. The latex in the case of Ficus elastica coagulates very soon. Bamboo mats are held to collect the falling latex by coolie boys and after sometime the incisions get blocked with coagulated latex. Both of them are taken and handpicked to clear them from bits of bark, wood, dirt, etc., and then pressed by rollers. In this way the extra moisture in them is got out and then they are allowed to dry for some time and packed in suitable sizes and shapes. (C. Bald.)

3. The third source by which rubber is obtained is from the tree *Manihot Glaziovi*, Mull. Arg.; belonging to the natural order Euphorbiaceæ. This rubber is called the Ceara rubber. In South India, this is grown in the Nilgiris, Mysore and South Coimbatore. The plant is easily grown by seeds or cuttings. The plant is very hardy, grows fast and is rarely subjected to the attacks of animal or vegetable enemies. It requires no attention when once established and thrives in poor dry rocky soils unsuited to almost any other crop. It produces a good class of rubber second only to Para rubber. (Dr. Watt's Dy.)

4. Another source of rubber is from the tree *Castilloa elastica*, Cerv. belonging to the Natural order Urticaceæ. This rubber is called the ule tree rubber. The plant has been fairly successfully grown on the hills of South India, as for example near Calicut and Malabar as also on the Nilgiri Hills (Barliar). The exhibited specimens of Castilloa rubber are from the Barliar gardens, Nilgiris. It thrives well in places where coffee is successfully grown and so the conditions required for the cultivation of coffee will suit for the cultivation of the ule rubber. It is easily propagated from seeds or cuttings. A seven or eight year old tree yields 1 to 2 lb. of latex per annum, 25 per cent of which is cauotchouc, separated by centrifugal machines. Castilloa milk flows freely and does not coagulate quickly. Tapping is done in just the same way as in the other cases with small differences. (Watt's Dy.)

The exhibits are samples of Rubber grown in Southern India.

1. *Para Rubber.*—Hevea Brasiliensis Mull. Arg. Plate of rubber melted in shape. Travancore.

2. Same.

3, 4, 5 and 6. All from Travancore.

7. *Para rubber* from Nilgiris.

8. Biscuits of Para rubber from Barliar Estate, Nilgiris.

9 and 10. Marking and Tapping knives.

11. Picture of Castilloa Elastica Seedling.

12. *Para rubber* from Kullar, Nilgiris.

13. *India rubber.* Ficus elastica, *Roxb* ; Kullar, Nilgiris.

14 to 18. *Ceara rubber.* Manihot glaziovii.

14 is from Pandalur, Wynaad.

15, 16 and 17 are from Kullar, Nilgiris.

18 is from Barliar, Nilgiris.

TODDY TAPPING ARTICLES.

The articles exhibited in this case are from Tinnevelly district and ravancore State. All the ones exhibited are not used for tapping. A umber of cup-like articles made out of the spathe of areca nut palms are ips used for drinking the toddy. There is a large vessel-like article made ut of the areca nut palm spathe. The toddy drawers of Travancore carry eir knives, wooden mallets, etc., in such vessels. There is a small ooden mallet used for tapping the palm. There are besides mallets ade of bone and iron. The other articles exhibited are leathern belts for olding the knives, etc., in position, knives and wooden cases for holding e knives, a small vessel made of coconut shell which carries the oil that used in sharpening the knives; palmyra caps for the head used by the ppers, and palmyra ropes for legs and hips used in climbing up the trees.

WOODEN AND LACQUERED TOYS AND PENCILS.

For lac see Tacchardia lacca under Dyes, Tans and Mordants, page 113.

Kinds of Lac—1. *Stick Lac.*—The name given to old encrusted twigs.

2. *Lake lac or lac dye*—the resinous incrustation after removal from e twigs is dissolved in water and the latter allowed to evaporate.

3. *Shell lac*—the resinous incrustation is washed in water and then urified by subjecting it to heat and filtering the liquid thus obtained.

The South Indian Lac is chiefly used in the manufacture of bracelets, ngs, beads and other trinkets worn as ornaments by women of the poorer asses, but also as a coloured varnish for wooden toys, etc., and as a dye-uff for woollen yarns in the Vellore Central Jail.

The following are exhibits of lac formed on twigs of trees :—

. **Zizyphus jujuba**, *Lam.* The Indian Jujube or Chinese Date. N.O. Rhamneæ.

Tam. Elanda. *Tel.* Regu.

Twigs with incrustation of lac.

. **Schlecheira trijuga**, *Willd.* The Lac tree or Ceylon Oak. N.O. Sapindaceæ.

Tam. Pumaram. *Tel.* Rotanga.

Twigs with incrustation of lac.

. **Butea frondosa**, *Roxb.* The Bastard Teak. N.O. Leguminosæ.

Tam. Murukkan. *Tel.* Modugu.

Twigs with incrustation of lac.

. **Ficus religiosa**, *Linn.* The Peepul. N.O. Urticaceæ.

Tam. Arasa. *Tel.* Ragi.

Twigs with incrustation of lac.

. **Shellac.** See note on *Tacchardia lacca* under Dyes, Tans and Mordants.

. Lac sticks with which wooden toys are coloured.

7. Toys made from the wood of *Wrightia tinctoria*, R. Br. N.O. Apocynaceæ.

Tam. Pala, Veypale, Vetpala.

Tel. Tedlupal, tellapal, tedlapala, Kalinga.

Kan. Beppalli, hale. *Hind.* Indarjon, mitha indarjou.

A small deciduous tree, common in Madras. Distributed in Central India, Western Coast and Burma. The wood is white like ivory, hard and compact. Used for toys, carving, and buildings.

8. Toy locomotives polished, roughly lacquered and completely lacquered.

These toys are from Vellore, North Arcot district and Channapatna (Mysore State).

9, 10, 11. Lac articles from Naurangapur, Vizagapatam district.

(*a*) Fly whisk.

(*b*) Chain.

(*c*) Rattle.

12. The stages in the manufacture of lacquered toys made from the wood of *Wrightia tinctoria* are shown. All the articles are from Etikoppaka, Vizagapatam district.

13. Toys from the wood of *Gyrocarpus jacquine*, Roxb. The articles are from Kistna district. N.O. Combretaceæ.

Tel. Tanuku manu, Poruku, Kummara Poruku. *Hind.* Zaitun.

A tall deciduous tree, common in South India and grows up to an altitude of 1,000 feet. The wood is grey, soft, and of light weight. It is widely used in South India to make boxes, toys and above all catamarans.

14. The stages in the manufacture of the toys from the wood of *Gyrocarpus jacquini* are shown. These are all from Kistna district.

15. Toys made from the wood of Red Sanders Tree *Pterocarpus sanatlinus*, Linn. The Red Sanders tree. N.O. Leguminosæ.

Hind. Rukhto-chandan, Lalchandan, ragat chandan.

Tam. Seppu chandanam, Shandanam, Vakta chandan.

Tel. Erragandhapuchekka, Vakta chandanum.

Kan. Kempugandha cheke, Honne.

A small tree of South India, chiefly found in Cuddapah, Kurnool, North Arcot and Chittoor districts. The tree is being widely cultivated in these districts on account of its economic value. The sap wood is white and the heartwood purplish black. Used for buildings, making toys, etc. The wood is very resistant to the attack of white-ants.

The articles are from Tirupati, Chittoor district.

BAMBOOS AND BAMBOO ARTICLES.

N.O. Gramineæ.

The bamboo is one of the most useful plants to man. There are 117 species in India and these are distributed over 15 genera. Specimens from not less than eight genera are exhibited as the most common and useful bamboos of South India. Since all bamboos may be viewed as of great economic and industrial value, it would not be out of place to collect together all general features about them here.

The plant belongs to the family of grasses. The home of the giant forms of it is the tropical and extra tropical forests ; in the temperate zones, the bamboo dwindles down to a mere undershrub or a herbaceous grass. The bamboo stem, as in grasses in general, consists of a more or less hollow *culm*, with transverse solid joints called nodes. The thickness of the node (woody shell) and the length of the internodes varies considerably in the different species. All bamboos have this peculiarity namely that their young shoots have a very rapid growth. Like other plants, the bamboo, branches well after reaching a good height and then curves down on account of the weight and presents a beautiful appearance. As a rule the bamboo is gregarious establishing itself so thoroughly over certain wild tracts of forests that it very nearly exterminates all other forms of vegetation.

Some bamboos grow in clusters or clumps while certain others shoot up singly from an underground root stock and thus form continuous patches extending sometimes to many miles. In South India and generally in all tropical countries the clump form of bamboo is more common. Each clump contains 30 to 100 *culms* and each *culm* attains a height of 100 to 130 feet.

The flowering of the bamboo is interesting. All the species begin to flower when in full leaf but as the inflorescence begins to expand the leaves as a rule fall off, until when in complete flower the clump or certain portions of it are leafless. In some cases special flowering culms are produced, at other times every culm flowers, the flowering portion of the entire clump dying off after the seed has been matured. Some bamboos are annual while others are perennial. One curious fact about the bamboo is it flowers at all times of famine and its grains then form a very useful food.

Bamboo is best propagated by means of cuttings.

Bamboo fibre is best suited for the manufacture of paper but there are great difficulties in cultivating it in large quantities so as to obtain a large supply for the manufacture of paper at a time. Still the industry is to be tried and not given up and attempts must be made to combat the difficulties that stand in the way.

Bamboo is also useful as a medicine and for this see Bamboo under Drugs.

The young shoots and leaves are eaten by many natives of India. The grain of the bamboo is used as food during famine times. Some bamboos are useful as fodder suppliers.

All bamboos are very good as fuel. As timber bamboo is invaluable, bamboo forms " the most important of the minor forest produce of

all forest divisions, and one that increases in value every year." With bamboos one can erect a house and furnish it fully with chairs, tables, cots, etc. Bamboos are used as posts, rafters, boat oars, masts. Some bamboos are useful for basket work and matting.

Bamboo as a domestic article is used in hundreds of ways. With bamboo, vessels, spoons, knives, ladles, fishing appliances, agricultural implements, country carts, bows and arrows, different kinds of musical instruments, walking sticks, etc., all these are made. (Watt's Dy.)

The following are the chief South Indian genera and species exhibited, together with the more valuable special properties of some.

1. Arundinara Wightiana, *Nees.* Nilgiri and other hills in South India at 6,000 to 8,500 feet.

Uses.—The culms are used for mats, baskets, walking sticks and fencing. (Gamble Timbers.)

2. Bambusa affinis, *Munro.* Plains of South India. Scandent in habit.

3, 4, 5 and **6. Bambusa arundinaceæ**, *Willd.*

Tam. Mangal. *Tel.* Bonga, bonga veduru, pente veduru.

Kan. Bidungulu.

Common all over South India. This is a tall magnificent species, recognised by its thorns and peculiar culm sheaths. For building purposes, mats, baskets, etc. The leaves and young shoots form a good fodder for elephants. (Gamble Timbers.)

7. Bambusa Balcooa, *Roxb.*

Common in Assam and Bengal and cultivated in many places. This is a large strong bamboo with greyish green culms 50 to 70 feet high and 3 to 6 inches in diameter. Used generally for scaffolding and building. (Gamble Timbers.)

8. Bambusa nutans.

Native of Northern India. Cultivated elsewhere on the hills. Uses—Building purposes, mats and basket work. (Gamble Timbers.)

9. Bambusa spinosa, *Roxb.* The Spiny Bamboo.

North-eastern districts of the Madras Presidency. This bamboo resembles closely Bamboo arundinaceae and Dr. Brandis thinks this merely as a variety of Bamboo arundinaceæ. For many useful purposes, such as building, mats, basket work sticks, etc.

10. Bambusa Tulda, *Roxb.*

Northern Circars. It is often cultivated, 20 to 70 feet high and 2 to 4 inches in diameter. Building purposes, mats and basket work. The young shoots are eaten. (Gamble Timbers.)

11. Cephalostachyum pergracile, *Munro.*

Native of Burma. Cultivated elsewhere. A deciduous arborescent bamboo. Building purposes, floating timber and mat-making. The Burmese cook their food in joints of the green bamboo. (Gamble Timbers.)

12. Dendrocalamus giganteus, *Munro.*

Native of the Malay Peninsula. Cultivated in Malabar. The largest of the Indian bamboos. The culms reach 80 to 100 feet in height and 8 to 10 inches in diameter. For posts and rafters in house building, for carts, etc., and the joints for pails, boxes, flower pots, etc. (Gamble Timbers.)

13. Dendrocalamus Hamiltonii, *Nees & Arn.*

A hill bamboo, common in North-East Himalaya, Assam, Upper Burma, etc. For mats and basket work. The young shoots are eaten. (Gamble Timbers.)

14. Dendrocalamus longispathus, *Kurz.*

A large and handsome bamboo, chiefly growing along streams. The culms reach a height of 60 feet. For basket work and building. (Gamble Timbers.)

15. Dendrocalamus strictus, *Nees.*

Tam. Kal Mungil. *Tel.* Kanka, Sadanapa Vedru.

The most common and most universally spread of all Indian bamboos. Found in the deciduous forests and dry regions of South India. In South India this bamboo grows tall nearly 50 feet in height. This bamboo has a great demand as it is used in many ways. Amongst these, the chief are, rafters and battens, spear and lance shafts, walking sticks, whip handles, the manufacture of mats, roofing, umbrellas, vessels cordage, etc. (Ref. Col. Doveton, Indian Forest, IX, 529.) The leaves are used as food for cattle and horses. (Watt's Dy.)

16. Dinochloa M'clellandi, *Kurz.*

Native of Burma and cultivated in India. An evergreen erect or scandent bamboo reaching a height of 100 feet and a diameter of 1 to 2 inches.

17. Gigantochloa atter, *Munro.*

Native of Malay Islands and cultivated in India. A large bamboo. (Gamble Timbers.)

18. Gigantochloa macrostachya, *Kurz.*

Found in tropical forests of Assam, Arracan and Burma. The culms reach a height of 50 to 80 feet and measure $2\frac{1}{2}$ to 4 inches in diameter. (Gamble Timbers.)

19. Ochlandra Rheedii, *Benth.*

Common in the West Coast of India in Malabar, Cochin and Travancore. A shrubby gregarious bamboo with erect culms up to 16 feet in length and 1 inch in diameter. (Gamble Timbers.) For fencing, sticks and other minor uses.

20. Ochlandra travancorica, *Benth.*

A very common bamboo in the mountains of Travancore and Tinnevelly at 3,000 to 5,000 feet. Also planted in Madras. An erect, reedlike shrubby gregarious bamboo growing to 20 feet in height and 1 to 2

inches in diameter. Has large flowers and fruits and stamens as many as 120 in one spikelet. The fibre is very good for the manufacture of paper. (Gamble Timbers.)

21. Oxytenanthera Bourdilloni, *Gamble.*

Common on the ghats of Travancore at 3,000 to 4,000 feet on steep precipitous places. A moderate-sized straggling bamboo, forming open clumps, culms up to 2 inches in diameter. (Gamble Timbers.) For minor purposes such as fencing, etc.

22. Oxytenanthera Thwaitesii, *Munro.*

Hills of Kurnool; hills of Western Ghats from the Nilgiris southwards at 3,500 to 6,000 feet. A straggling scandent gregarious shrubby bamboo with whiplike branches with culms 10 to 12 feet long and 1 inch in diameter. Not very much used excepting as rough sticks; the leaves are used for thatching. (Gamble Timbers.)

BAMBOO ARTICLES.

Fishing appliances.—There are two kinds of *Fishing traps* exhibited. Both are made out of bamboo cut up and split into bands and tied with threads. The mechanism of the traps can be easily understood from the exhibits. Both are used throughout South India especially in village parts.

Fish baskets are made out of bamboo cut up and split into bands.

Big and small *baskets* made of bamboo are also exhibited. These baskets are very convenient for carrying articles. They are strong and do not easily give way even when heavy articles like mud, or gravel are carried in them.

Out of bamboo cut up and split into bands *cradle* is made. It is as good as rattan cradle though a little rough in texture.

Sieves, sifters and *winnows* of all sizes and shapes are easily made with bamboo.

Cages of birds made out of bamboo strips are also exhibited. These are strong and cheap. *Water buckets* are made of bamboo pieces and these are extensively used in the country parts to transfer water from a pool or tank into an irrigating channel.

Excellent screens for doorways, windows and verandahs are easily made with bamboo split up into fine pieces and tied with good threads. And when these are coloured with a good paint they present a very good appearance.

Kavadi.—To a strong bamboo is attached at either end something like a pan—all made of bamboo material. The cooly rests the bamboo on his shoulder and carries luggages in these pans.

Cotton winder is made out of bamboo and these are very common in cotton growing countries such as Tinnevelly, Cuddapah, Kurnool, etc.

Fans, play swords, knives, etc., made of bamboo are exhibited. The bamboo fans are very common in Cuddapah, Kurnool and Bellary districts.

Pails, lamps.—These are manufactured by cutting a piece of a bamboo which is rather broad in diameter, just above a node.

MISCELLANEOUS FIBRES AND FIBRE YIELDING MATERIALS.

1. Abroma augusta, *Linn.* Perennial Indian Hemp, Devil's Cotton. N.O. Sterculiaceæ.

Tam. Chivauppttutti. — *Hind.* Ulatkambal.

A shrub, found both wild and cultivated throughout the hot moist tracts of South India. The bark of the twigs yields a strong, silky, white fibre which is separated by steeping the bark in water for about a week. The fiber is used for cordage and as a substitute for hemp and flax. (Dr. Watt's Comm. Prods.)

2. Abutilon indicum, *G. Don.* Country Mallow. N.O. Malvaceæ.

Tam. Tutti, Perundutti.
Kan. Kisangi, Gidutingi, Srīmudre.
Tel. Tutturubenda, Adavibenda.
Mal. Kātturam, Tuvatti.
Hind. Kanghī, Jhampi.

A shrub, common everywhere on the plains in South India. The stem contains a strong, good fibre used for cordage. (Dr. Watt's Comm. Prods.)

3. Acacia intsia, *Willd.* N.O. Leguminosæ.

Tel. Korinta.

A large climbing shrub, common all over South India, ascending to 4,000 feet. The fibre is used as a substitute for soap in washing the hair. (Dr. Watt's Dy.)

4. Acacia latronum, *Willd.* N.O. Leguminosæ.

Tam. Ānaimullu, Chāli, Chiruvudai, Kandānchi, Kārudai, Kudaivēl, Mulvēl, Udai.
Tel. Burujāla, Boggili, Gabbujāli, Jāla, Pakketumma.
Kan. Ānigobbuli, Donnemullinajāli, Ottejāli.
Hind. Bhes.

A very thorny shrub, common in the Deccan and the Carnatic. The bark yields a fibre. In the districts of Rāmnād and Tinnevelly the bark is cut and allowed to remain in water for four or five days and then taken out and beaten well, till it assumes the appearance of fibre. The fibre is used for fish-traps, fish-baskets, etc.

5. Acacia leucophlæa, *Willd.* N.O. Leguminosæ.

Tam. Velvēlam, Velvēl.
Tel. Tellatumma.
Kan. Bilijāli, Nāyibēla, Toppalu, Tumbe, Darukhagar.
Mal. Vellavēlakam, Velvēlam.
Hind. Safedkikar, Rerū, Raung, Karir, Nimbar, Ringa, Ring, Rohani, Jhind.

A tree, common in the dry forests of South India. The bark yields a coarse, tough fibre which is prepared by beating the bark with a stone or mallet for four or five days and then allowing it to remain in water for some time. Fibre is used for fishing-nets and ropes. (Dr. Watt's Comm. Prods.)

6. **Acacia planiformis**, *W. & A.* N.O. Leguminosæ.

Tel. Sale, Sal.

A small gregarious tree with flat umbrella-like spreading branches. Common in very dry situations. In South India, frequently met with in Madura, Rāmnād and Tinnevelly district. The fibre is used for cordage. The fibre is obtained from the stems by soaking them in water and beating them to separate the other tissues mixed with the fibre.

7. **Adansonia digitata**, *Linn.* Baobab, Sour Gourd, Monkey Bread Tree of Africa. N.O. Malvaceæ.

Tam. Ānaippuli, Pāppārappuli, Perukku, Puri.
Tel. Brahmamlika, Maggimāvu, Sīmachinta.
Kan. Brahmāmbika, Ragimāvu.

A tree of Upper Guinea, cultivated in many parts of South India. The bark yields a strong fibre, used in India for elephant saddles; in Africa for rope, twine, sacking and cloths; said to be useful for the manufacture of a strong paper suitable for bank notes. (Drury; Gamble.)

8. **Agave americana**, *Linn.* American Alœ. N.O. Amaryllideæ.

Tam. Ānaikkatrazhai. *Tel.* Rakashimattalu.
Kan. Kalnāru, Rākshasabāle. *Mal.* Panamkatrazha.
Hind. Bakaspattah Halhīsengar, Barākanvar, Janglikanvar.

An American plant cultivated and naturalised in various parts of South India and chiefly in Coimbatore; often found as a hedge plant along railway lines. It thrives well only in open places. The age of the plant from which leaves are taken is from six to seven years.

The leaves yield a good fibre. The method of extracting the fibre is either by *scraping* or *maceration*. In the former case the sharp spines of the leaves are removed and a small part of the top cut off. The leaves are then split longitudinally into four or five pieces and placed on a flat board held firmly by the toes and beaten. As a result of which the pulp of the leaves is liberated and this is removed by means of a bamboo scraper, one edge of which is shaped in the form of a blade. What is now left behind is merely the fibre.

In *maceration* after the spines are removed the leaves are beaten and thrown in bundles into tanks or wells in which they are left to macerate for a fortnight or twenty days or longer if the pulp is not quite decomposed. The bundles are then taken out, dried and bleached in the sun. The fibre is used for cordage, agricultural purposes, carpets, mats and brush-making and the fibre-waste for paper making. (Royle's Fib. and Dr. Watts' Dy.)

9. **Agave vivipara**, *Linn.* Bastard Aloe. N.O. Amaryllideæ.

Tam. Erumaikkarrālai, Malaikkarrālai.
Tel. Peddakalabanda, Kittanāra.

An American plant, cultivated and naturalised in various parts of South India. The leaves yield a good fibre which is extracted by allowing the leaves to rot in water for twenty days and then beating them on planks and finally thoroughly washing the resulting fibres Fibre is used for cordage, ropes and mats. (Dr. Watt's Dy. and Royles Fib.)

10. Albizzia amara, *Boiv.* N O. Leguminosæ.

Tam. Chīkkirām, Chīkkiri, Turinchil, Unchai.
Tel. Chigara, Cīkirēnu, Nallarēgu, Nallangi.
Kan. Balukambi, Suggalu, Tuggali, Kādusīge.
Mal. Chūlivāka, Vārāsi.

A deciduous tree, common in the dry forests of South India. The bark yields a coarse fibre used for cordage.

11. Anodendron paniculatum, *A. Dc.* Apocynaceæ.

Kan. Maniballi.

A large shrubby climber of the Western Ghats. The stem yields a strong and good fibre. The fibre is much used by the Singhalese for many purposes. (Watt's Dy.)

12. Anona reticulata, *Linn.* Bullock's Heart, True Custard Apple. N.O. Anonaceæ.

Tam. Aninunā, Irāmachīttā, Manilāyātta.
Tel. Rāmaphalamu, Rāmasītaphalamu.
Kan. Rāmaphala.
Mal. Mānilānīlam, Parankichakka, Rāmachīttā.
Hind. Lounā, Rāmphal.

An American tree, cultivated in various parts of South India. The bark of the young twigs yields a good fibre used for cordage. (Watt's Dy.)

13. Antiaris toxicaria, *Leschen.* Upas Tree. N.O. Urticaceæ.

Tam. Ali, Maravuri, Nettāvil.
Kan. Ajanapatte, Aranyi, Bairi, Jagguri, Billupāle.
Mal. Arayānali, Nettavil.

A large evergreen tree of the Western Ghats. The bark, when stripped into large pieces, soaked in water and beaten yields a good white fibre. The fibre is used as a natural cloth worn by some hill-men of the West Coast and for making natural sacks for storing rice and for matting ; in Ceylon for ropes. (Watt's Comm. Prods.)

14. Artocarpus hirsuta, *Lamk.* Anjeli Woodtree, N.O. Urticaceæ.

Tam. Anchali, Āyinibilā, Kāndambalā.
Kan. Hebbalasu, Hechuva.
Mal. Ānnili, Āyini, Āyinipilāvu, Kattupilāvu.

A large tree of the Western Ghats. The bark yields a fibre whose uses have not yet been studied.

15. Bauhinia parvifolia, *Teysm & Binn.* N.O. Leguminosæ.

A tree of Tenasserim, cultivated in South India. The bark yields a fibre used for cordage.

16. Bauhinia racemosa, *Lam.* N.O. Leguminosæ.

Tam. Ārai, Arikka, Āram, Ātti, Tādagi.
Tel. Adaviyavise, Āre.
Kan. Āra, Āralumandāra.
Mal. Kotapuli, Mandāram.
Hind. Kachnāl, Gūriāl, Thaur, Ashta, Makkūna, Maula, Dhorāra, Marvil, Ghila.

A tree of the dry deciduous forests of South India. The inner bark yields a strong fibre used for cots, tying fences and other agricultural purposes. (Rep. on the Fib. of S. India.)

17. Bauhinia Vahlii, *W. & A.* N.O. Leguminosæ.

Tam. Mandaraikodi. *Tel.* Addatīge, Mādapu.
Kan. Anepādu, Hepparige. Kambihu. *Mal.* Mottanvalli.

A large climber, common all over South India. The inner bark yields a fibre that is said to be dyed, bleached and worked up along with wool. To extract the fibre the bark is generally boiled and then pounded. The fibre is used for ropes for tying up cattle and sewing straw mats, as strings for charpoys, occasionally for suspension bridges over mountain torrents on the Himalayas. (Dr. Watt's Dy.; Rep. on Fib. of S. India.)

18. Boehmeria nivea, *Hook & Arn.* Rhea, China-Grass. N.O. Urticaceæ.

A shrub of China and Japan introduced into India; planted for experimental purposes by the Madras Horticultural Society and by the Glenrock Company in the Nilgiris and Wynaad hills. The stems contain one of the finest and strongest fibres which is extracted in Northern India by a special process of retting and decortication. In India the fibre is spun into coarse thread for fishing lines, etc. In Europe for sacking, sail cloth, belting, table-cloth, sheeting, shirting, dress cloth, laces, fishing lines, nets, cordage and paper. (Watt's Dy.)

19. Boehmeria platyphylla, *D. Don.* N.O. Urticaceæ.

A shrub, common in the Northern Circars, the Deccan, the Western Ghats and the Nilgiris. The inner bark yields a strong white fibre used for cordage. (Watt's Dy.)

20. Bombax malabaricum, *D.C.* Silk Cotton Tree. N.O. Malvaceæ.

Tam. Ilavam, Ilavu, Mullilavu, Pūlai, Pūrani, Kōngu.
Tel. Būraga, Kondabūraga, Mundlabūraga, Pinnabūraga, Sālmali.
Kan. Būraga, Elava, Sālmali, Ala.
Mal. Ilovu, Mōcha, pula, Mullilavu, Unnamurikku, Purani.
Hind. Sēmal, Shembal, Semur, Ragan, Ragatsēnbal.

A large tree, common all over South India. The inner bark yields a good fibre. The floss of the seeds afford the red silk-cotton or simal-cotton, a fibre which is too short and too soft to be spun. The fibre is said to be suitable for cordage; the floss is used for stuffing pillows, etc. (Watt's Dy.) Observe floss and fibre.

21. Borassus flabellifer, *Linn.* Palmyra Palm. N.O. Palmæ.

Tam. Panai, Panam, Pannamaram, Pannil. *Tel.* Tātichettu.
Kan. Tāta, Tāle, Panē. *Mal.* Pana, Tālam.
Hind. Tāl, Tāla, Tār, Tāri.

A palm, common on the plains of South India. The leaf-stalks yield a strong and wiry fibre. It is extracted by cutting the leaf-stalks which remain clinging on the tree after the leaves have been

removed and by beating them on a stone with a wooden mallet and pulling out the fibres which are subjected to a further process of cleaning by beating them on the ground or by combing them with a wooden comb.

The leaf-scales and flower-buds yield a kind of tomentum.

The fibre is used for making ropes, employed for tying cattle-yokes and other agricultural purposes, twine, lacings of cots, tying up faggots; said to be suitable for brush-making. The tomentum is used as a tinder. Fibro-vascular bundles are made into invisible fish traps in Bengal. (Dr. Watt's Dy.; Rep. on Fib. of S. India.)

Observe—

Leaf base.
Different fibre specimens.
Floss.
Fish-trap.
Bass broom.
Brush.
Banister.

22. Buchanania latifolia, *Roxb.* N.O. Anacardiaceæ.

Tam. Katma, Morala. *Tel.* Chara, Chinna Moral, Morli.
Kan. Nurkul, Murkalu. *Mal.* Mungapera.

A middle-sized tree, met with in the dry forests throughout India and ascending in the Sub-Himalayan tract to 3,000 feet. The fibre is used for cordage.

23. Butea frondosa, *Roxb.* Bastard Teak. N.O. Leguminosæ.

Hind. Dhak, Palās, Tēsūkāper, Kakria, Kankrei, Chichra.
Tam. Chīrā, Kāli, Kāttumurukku, Kinchugam, Kirumichatturu, Murukku, Palāchu, Punamurukku, Punamurungai, Pungu, Pūppalāchu, Purachu, Tikkuru, Vādabōdam, Valla, Vallaippurachu, Mukkappūyam.
Tel. Kimsukamu, Moduga, Palāsamu, Tellamoduga, Togarumōduga, Vātapōdhamu.
Kan. Brahmavryksha, Muttuga, Muttaia.
Mal. Palāsi, Murikku.

A tree, common all over South India, chiefly on the plains. The young roots and bark yield a strong fibre used for cordage and ropes; in some parts of India for making native sandals; said to be useful for paper-making. (Dr. Watt's Dy.)

24. Butea superba, *Roxb.* N.O. Leguminosæ.

Tel. Mōduqatige, Tivvamōduga. *Kan.* Muttaginaballi.

A large climber, common in the Northern Circars, the Deccan, and the Coromandel Coast, usually on black cotton soil. The roots and young branches yield a strong, useful fibre used for cordage. (Dr. Watt's Dy. and Drury.)

25. Calotropis gigantea, *Br.* Gigantic Swallow wort. N.O. Asclepiadeæ.

Hind. Madāar, Āk, Ākond.
Tam. Erukkam, Nūbam, Udumbaram.
Tel. Jillēdu, Nallajillēdu, Ūste, Tellagillēdu.
Kan. Ekke, Arka. *Mal.* Erikku, Dinēsam.

An erect, spreading shrub common on the plains of South India, frequenting waste land. The inner bark yields the madar fibre, which is said to be one of the best of Indian fibres. The fibre is extracted in either of the following ways :—

The tender branches are cut and exposed to wither. The skin is then peeled off and the fibrous substance between the wood and the bark is easily separated by the hand.

Small sickles or knives are employed to scrape the fibre from the dried plants. The stem is buried in the sand in the bed of a river for about two hours during the heat of the sun afterwhich the fibre is easily separated from the wood.

A silk-cotton known as Madar floss is obtained from the seeds. This fibre is soft, very white and has a fine silky gloss. The fibre is used for pellet bows, fishing-rods, nets for catching birds and cloths used by Gadabas, an aboriginal tribe of the hills of Vizagapatam district. The floss is used for stuffing quilts, etc., and is sometimes spun and made into fishing lines and nets (Watt's Dy. ; Rep. on Fib. of S. India.)

26. Cannabis sativa, *Linn.* Hemp. N.O Urticaceæ.

Hind. Bhāng, Gānjā, Charas. *Tam.* Gānjachedi, Kalpam.
Tel. Ganjachettu. *Kan.* Bhangigida.
Mal. Tsjeru, Causjava.

An annual plant, cultivated more or less throughout India on account of the narcotic principle. The stem yields the hemp fibre ; but the narcotic yielding plants produce only a very inferior fibre used for cordage, ropes and coarse textiles. (Drury ; Watt's Dy.)

27. Careya arborea, *Roxb.* N.O. Myrtaceæ.

Hind. Kumbi, Vākamba, Kamba, Kambhi, Kumbh, Khumbi.
Tam. Āymā, Karnēkku, Kumbi, Pēla.
Tel. Araya, Buddabūrija, Budatadadimma, Budatanevadi.
Kan. Ālagavvele, Doddala, Gavvahannu, Pīlu.
Mal. Ālam, Pēlu, Pīlu, Uka.

A tree common all over South India in moist forests.

The bark yields a strong, red fibre used for coarse cordage. (Watt's Dy.)

28. Caryoia urens, *Linn.* Sago Palm, Hill Palm. N.O. Palmæ.

Hind. Mari.
Tam. Īrampanai, Kūndarpanai, Pūgam, Tālam.
Tel. Bakini, Jīvalaggu, Jīluga, Māre.
Kan. Bayne, Indu.
Mal. Ānappana, Chūntappana, Īrampana, Kālapana, Vaināvu.

A palm, common in the Northern Circars, shady valleys of the Deccan and the Western Ghats, much planted in gardens. The leaves and leaf stalks yield the kittul fibre which is very strong and durable and will resist for a long time the action of water. The leaves also contain a wooly substance at the bottom. The kittul fibre is made into ropes, brooms, baskets, bowstrings, fishing lines, sackings, etc., and is said to be suitable for the manufacture of brushes and paper. The wooly substance found at the bottom of the leaves is occasionally employed for caulking ships. (Gamble : Indian Timbers ; Dr. Watt's Dy.)

29. **Cochlospermum gossypium**, *D.C.* White Silk-Cotton Tree. N.O. Bixineæ.

Hind. Kumbi, Gabdi, Ganiār, Galgal, Gangal.
Tam. Tanakku, Kīngilavu, Kōngu, Kāttilavu.
Tel. Adavibūraga, Kondabūraga, Būraga, Kondagōdu, Kōngu.
Kan. Arasinabūraga, Bettatāvare, Gagilu.
Mal. Appakutakka, Chempanni, Panninära, Pārapanni, Sīmapanni.

A small deciduous tree of the dry forests of South India. The seeds yield a floss which resembles soft, silky cotton used for stuffing pillows, etc. (Watt's Dy.)

30. **Cocos nucifera**, *Linn.* Coconut Palm. N.O. Palmæ.

Hind. Narel, Nāriyel. *Tam.* Tenna, Tenga.
Tel. Nārikēlamu, Tenkāya, Kobbari. *Kan.* Tenginagida.
Mal. Tennā.

A palm, cultivated chiefly along the sea coast in South India. Coconut husks yield the coir fibre. The fibre is prepared by removing the husks by means of an iron spike fixed in the ground with point upwards, soaking the husks in water for two or three months and beating the rotten husk with wooden hammers. The fibre is used for ropes, thatching, native crafts, stuffing mattresses, matting, door-rugs, hassocks, hammocks, bags for seed-crushers, oil-presses, etc., and other agricultural purposes, and brushes.

A delicate tomentum or cotton found at the leaf base is employed as a styptic. (Watt's Dy.)

The following articles made of coir are exhibited in a case in Hall 2 :—

Uncleaned and cleaned coir.
Coloured samples.
Coir ropes, brush, mat, bags, sack, glove for cleaning cattle.
Husk used as a brush.
Washing brush.
Broom.
Banister.
Weaving brush.
White washing brush.
Paint brush.
Scrubbing brush.

31. **Corchorus olitorius**, *Linn.* Jute, Jew's Mallow. N.O. Tiliaceæ.

Hind. Singinjanascha, Koshta. *Tam.* Peratti-kīrai, Punakuchedi.
Tel. Parinta.

An annual plant, found all over India, cultivated on a commercial scale in Bengal. The plants afford the jute fibre which is mostly extracted by a process of retting. The fibre is very fine, silky and yellowish and can also be easily spun, but only to lower counts. The fabric manufactured from jute lasts well only when it is not subjected to dampness. The fibre is used for gunny bags, fine cloths used for sleeping on, coarse cloth used for making the sails of country boats and for bags to hold large seeds or fruits, cordage and paper which is manufactured mostly from rejections and cuttings, in England for manufacturing carpets, curtains and shirtings, and for adulterating silk. (Dr. Watt's Comm. Prods.; Royle's Fib.)

32. Cordia myxa, *Linn.* Sebesten Tree. N.O. Borragineæ.

Hind. Lasora, Lasūrā, Bhokar, Gondi.
Tam. Chirunaruvili, Vidi, Virichu.
Tel. Bankanakkera, Chinnabotuku, Chinnanakkera, Nakkera, Virigi.
Kan. Challa, Chotti, Mannadike.
Mal. Chēlu, Vīriyasam, Cheruviri.

A tree, common all over South India, often planted. The bark yields a fibre used for ropes, for caulking boats and for fuses. (Watt's Dy.)

33. Crotalaria juncea, *Linn.* Sunn or Sunn-Hemp, Indian Hemp. N.O. Leguminosæ.

Hind. San, Sanai, Sani. *Tam.* Jenappa, Janumu.
Tel. Jenapa, Janumu. *Kan.* Sanabu, Shanabinā pundi.
Mal. Janapa, Vakkavanji, wuckīr.

An annual plant extensively cultivated all over the Madras Presidency. The plants yield the sunn-hemp fibre which is one of the most important of Indian fibres. The method of preparing is as follows:— The plants are either cut close to the ground or pulled up by the roots and tied into bundles and carried to the threshing floor where the plants are freed from legumes by being threshed either by beating or by allowing cattle to tread over the stalks. These stalks are later on either buried in mud or left to rot in water for about a week or longer when they are taken out and beaten in water, as a result of which the fibres separate. These fibres are again subjected to further threshing by which all impurities are removed.

The fibre, which is usually met with, exists in tangled masses of a dull, greyish-white colour. It is supposed to lose one-third of its mass in heckling. It is, however, suited for purposes of spinning. The fibre is used for weaving canvas, for stitching gunny bags, for cots, curtains, water buckets, etc., ropes, cordage and fishing-nets; the waste tow is used for the manufacture of paper. (Watt's Dy.)

34. Cryptostegia grandiflora, *R. Br.* N.O. Asclepiadeæ.

Tam. Garudappālai, Palai. *Mal.* Pāla.

An evergreen climber of Madagascar, cultivated in various parts of South India. The plant yields a good, strong fibre resembling flax. The fibre is said to be useful for spinning into the finest yarn. (Drury.)

35. Debregeasia velutina, *Gand.* N.O. Urticaceæ.

Tam. Kāttunochi. *Tel.* Kerangi.
Kan. Keppasi, Kurigela.

A shrub, common in the Northern Circars, the Deccan and the Western Ghats and the Nilgiris. The plant yields a strong fibre used for ropes, cordage, fishing-lines, etc. (Watt's Dy.)

36. Derris scandens, *Benth.* N.O. Leguminosæ.

Tam. Ānaikattu, Kodippungu, Punalikkodi, Tegil.
Tel. Chiratalaboddutīge, Chirukatīge, Nallachiratalativva, Suruli.
Kan. Handiballi.
Mal. Muyalvalli, Nūlalvalli.

An evergreen climber, common all over South India. The bark affords a coarse fibre used for ropes. (Watt's Dy.)

37. Dichrostachys cinerea, *W. & A.* N O. Leguminosæ.

Hind. Vurtuli.
Tam. Anattēr, Māvilandam, Varittulā.
Tel. Venuturu, Veluturu, Nēlajammi, Samīramu, Saratumma.
Kan. Odatāre, Odavare, Odavinaha.

A tree, common in the Northern Circars, the Deccan and the Carnatic in dry arid soils. The bark yields a yellowish-white fibre whose uses are not known.

38. Dolichandrone falcata, *Seem.* N.O. Bignoniaceœ.

Tam. Kadalātti, Kaliyāchā, Kāttubarucham, Keluvarbandam, Pachalātti.
Tel. Chittinīruvoddi, Chittivoddi.
Kan. Mudadavudure, Udure, Nuram.
Mal. Nīrponnālyadur.

A tree of the deciduous forests of South India, chiefly on dry, rocky slopes. The inner bark yields a coarse, black fibre.

39. Ficus bengalensis, *Linn.* Banyan. N.O. Urticaceæ.

Hind. Bor, Ber, Bargat. *Tam.* Āla.
Tel. Marri. *Kan.* Āla.
Mal. Āla, Pērāl.

A tree, common all over South India, much planted as an avenue tree. The bark and the aerial roots yield a coarse fibre used for coarse ropes ; said to have been used for the manufacture of paper. (Watt's Dy.)

40. Ficus religiosa, *Linn.* Peepul, Bo Tree. N.O. Urticaceæ.

Hind. Pipal.
Tam. Asuvattam, Arasa.
Tel. Rāvi, Rōhi, Asvaddhamu.
Kan. Arali, Arani, Arase, Asvattha, Basari, Ragi.
Mal. Arachu, Arayāl, Rohi.

A tree, sacred to the Hindus and Buddhists, found all over South India, often planted. The bark contains a fibre which was once used in Burma for the manufacture of paper used for their umbrellas. (Watt's Dy.).

41. Ficus Tsiela, *Roxb.* N.O. Urticaceæ.

Hind. Jari. *Tam.* Chēlaikkalichi, Chirrāl, Ichi.
Tel. Juvvi, Peddajuvvi Pittajuvvi. *Kan.* Bilibasari.
Mal. Chēla, Koyāli.

A tree, common in the Deccan, the Carnatic and the Western Ghats, chiefly found as an avenue tree. The bark yields a good fibre (Watt's Dy.)

42. Girardinia heterophylla, *Dene.* Nilghiri Nettle. N.O. Urticaceæ.

Hind. Awa, Alla, Bichna, chicho. *Mal.* Anaschorigenam.

An annual plant, common on the Nilgiris and the Western Ghats. The inner bark abounds in a long, white, soft and silky fibre which is extracted by the hill-men of the Nilgiris by a process of boiling. Fibre is used for spinning into thin coarse thread by the Todas of the Nilgiris. (Drury.)

43. Gossypium sp. Cotton. N.O. Malvaceæ.

Tam. Paruthi. *Tel.* Pratti.
Hind. Kapas. *Kan.* Dūdi, Hatti.
Mal. Parutti.

A shrub, cultivated all over South India, but very abundant in the districts of Cuddapah, Kurnool, Bellary, Anantapur, Kistna, Guntūr, Coimbatore, Madura, Rāmnād and Tinnevelly and in Mysore State. The seeds are covered over with cotton fibre which forms the most important of all vegetable fibres, on account of possessing special qualities which enable it to be twisted and spun easily. Cotton varies a great in colour, length of staple, etc., according to the variety from which it is derived. The following varieties are represented in the Museum collection :—

Bourbon, Mixed Bourbon, Northern, Western, Cambodia, Nādamparuthi, Ukkamparuthi, Uppamparuthi, Vallaikanni Karunganniparuthi Yeniparuthia, Tellapathi, Javaripathi Hiriyur Metikurki. The method of separating the fibre is by picking it from the plant and then subjecting it to a process of cleaning and ginning as a result of which the lint becomes free from impurities and also separated from the seeds. The fibre is used for higher textile purposes, such as cloths, etc.

44. Grewia tiliæfoila, *Vahl.* N.O. Tiliaceæ.

Tam. Chadachi, Unnu, Ūnā. *Tel.* Erratada, Jāna, Nulijāna, Tada, Tadayāna, Mupatada.
Hind. Pharsa, Dhamin, Dhāmanī. *Kan.* Buttele, Jāna, Tadachali, Tadajāna, Kanapadi.
Mal. Chatachi.

A tree, common all over South India. The bark yields a strong, harsh, yellow-brown fibre used for cordage. (Watt's Dy.)

45. Hardwickia binata, *Roxb.* N.O. Leguminosæ.

Tam. Āchā, Chulli, Karāchā, Kattudugu, Yālam.
Tel. Ēpe, Nārēpe, Nārayēpe.
Hind. Aujan, Aojan.
Kan. Āchā, Kamarū, Kārāchi.

A deciduous tree common in Gōdāvari, Kistna, Cuddapah, Kurnool, Bellary and Anantapur districts, both banks of the Cauvery, in Salem district, the Balarangams in Mysore State, Hāsanur and Gazelhati in Coimbatore district. The inner bark contains a strong, slightly wooly fibre which is extracted by beating the bark against stones. The fibre is used for strings and ropes for fastening cattle, stringing of country cots, etc. It is also a very useful paper material. (Watt's Dy.)

46. Helicteres Isora, *Linn.* East Indian Screw Tree. N.O. Sterculiaceæ.

Tam. Valamburi. *Tel.* Ādacāmauti, Gūbatada, Utrāchi.
Hind. Maraphali, Jonkaphal, Bhendu. *Kan.* Bhūtakarulu, Chunchulla, Edāmuri, Kādukalnāru, Kaiyuri, Murudi.
Mal. Īsvaramuri, Kaivalanāra, Valampiri.

A large shrub of the dry forests of Southern India. The inner bark yields a thin, strong, silvery and reticulated fibre, light-brown in colour. The fibre is used for cordage, coarse cloths, rough sacking, and canvas (Dr. Watt's Dy.) and for sewing gunny bags and for making bullock nose-ropes.

47. Hibiscus Abelmoschus, *Linn.* The Musk Mallow. N.O. Malvaceæ.

Tam. and *Tel.* Kasturi bendai. *Mal.* Kattu Kasturi.
Hind. Mushk-dana.

A herbaceous bush, springing up with the rains and flowering in the cold season. It is common all over the hot parts of South India. Like other species of this genus, this also yields a fibre from the stem which is highly valued. Used for cardage and forms a very good substitute for jute. Wetting does not affect the strength of the fibre. (Dr. Watt's Comm. Prods.)

48. Hibiscus cannabinus, *Linn.* Deccan Hemp, Ambari Hemp. N.O. Malvaceæ.

Tam. Pulimanji, Pulichi, Palungu. *Tel.* Gonkura.
Hind. Ambāri, Pātsan, Pulu, Nālita. *Kan.* Pundrike, Holada.
Mal. Kānchāru.

A small herbaceous shrub, found in cultivation all over South India. The stem yields a soft, white, silky fibre known as Deccan Hemp or Bimlipatam jute. The fibre is extracted in the same way as sunn-hemp. The fibre is used for course sack-cloth, ropes, cordage, coarse canvas, fishings-nets and paper. (Dr. Watt's Comm. Prods.) It is commonly but incorrectly called 'jute' in the Northern Circars.

49. Hibiscus tiliaceus, *Linn.* N.O. Malvaceæ.

Tam. Nirpparuti. *Tel.* Erragogu.
Mal. Nīrparatti, Tālipparutti.

A tree, common in the Carnatic and the West Coast. The bark yields a fibre which gains in strength when tarred. The fibre is used for cordage, ropes and mats; said to be suitable for the manufacture of paper. (Watt's Dy.)

50. Lasiosiphon ericcephalus, *Dene.* N.O. Thymelæaceæ.

Tam. Nāchanūar, Nancha. *Kan.* Ēnujāaiga, Mukute.
Mal. Nancha.

A tree of the Western Ghats and the Nilgiris. The bark yields a fibre said to be suitable for paper manufacture. (Watt's Dy.)

51. Malvastrum tricuspidatum, *A. Gray.* N.O. Malvaceæ.

An American herb introduced into various parts of the Madras Presidency. The plant yields a soft fibre whose uses are not known.

52. Musa paradisiaca, *Linn.* Banana, plantain. N.O. Scitamineæ.

Tam. Vāzai. *Tel.* Arati.
Hind. Kēla. *Kan.* Bāle.
Mal. Vālā.

A perennial herb, extensively cultivated throughout South India. The leaf-stalks yield a strong, glossy fibre which is easily dyed. The fibre is used for weaving cloths of fine texture and also of coarse texture, cordage, mats and pillows; said to be suitable for coarse paper. (Watt's Dy.)

53. Pandanus odoratissimus, *Willd.* N.O. Pandaneæ.

Tam. Tālum. *Tel.* Mugati, Gojjangi, Kētaki.

Hind. KeorāKetgī, Gagandhul. *Kan.* Tāle, Kyadage.

Mal. Tāla, Kaita.

A much-branched shrub, common on the coasts of South India; much planted for its scented flowers. The leaves yield a tough, white, glossy fibre which is extracted by cutting the leaves into slits, exposing them to the sun and wetting them with water. The drops or aerial roots also yield a fibre. The leaf fibre is used for cordage, hunting-nets, ropes for fishing-nets, matting, thatch, etc., in Mauritius for making sacks. The fibre of the roots is used for painting brushes and for mixing with flax in small quantities for the manufacture of gunnies and ropes; said to be good for paper manufacture. The aerial roots are used for whitewashing. (Royle's Fib., Watt's Dy.)

54. Phœnix sylvestris, *Roxb.* Wild Date Palm. N.O. Palmæ.

Tam. Īchampanai, Īnchu, Kāttinchu, Madal.

Tel. Īta.

Hind. Sendhi, Kejur, Khajūr, Khaji, Salma, Thalma, Thakil.

Kan. Andayīchalu, Īchala. *Mal.* Īnta, Īntappana, Kāttinta.

A palm, found all over South India. The leaves contain a fibre which is soft and bleaches well, while the fibre obtained from the branches and petioles is rather coarse. The fibre of the petioles and branches are used for ropes for drawing water from wells, for tying up cattle, etc.; the leaf fibre is said to be suited for the manufacture of paper. (Watt's Dy.)

55. Pongamia glabra, *Vent.* Indian Beech. N.O. Leguminosæ.

Tam. Pungu, Udagu, Tattaippungu.

Tel. Kānuga, Kāgu, Krānuga, Krīvi, Vyāgranakamu.

Hind. Karany, Papar, Kiramāl, Karanjaca.

Kan. Honge, Hūligili, Karanja.

Mal. Minnāri, Punu, Unnu.

A tree of the tidal and beach forests of South India and also along streams and rivers. The bark yields a coarse brown fibre, used for cordage.

56. Sansevieria zeylanica, *Willd.* Bowstring Hemp. N.O. Liliaceæ.

Tam. Marul. *Tel.* Chāga.

Hind. Marūl, Mūrvā.

A stemless bush, common on the Coromandel Coast, also found in cultivation. The fleshy leaves yield a pliant, soft, elastic and silky fibre which is extracted either by scraping with a piece of bamboo or by soaking in water. The fibre is used for cordage, ropes, bow-

strings, matting such as a mat known as *Durba chapaloo* made in Ganjam ; coarse gunny bags used for packing cotton, etc. ; for the manufacture of paper and sometimes for weaving cloths. (Watt's Dy.)

57. **Sida carpinifolia**, *Linn.* Hornbeam-leaved Sida. N.O. Malvaceæ.

Tam. Vattatrippi, Malaitangi, Mayirmanikkam, Vishabodhi, Chitimutti, Mutuvapulogum.
Hind. Bariāra, Kareta.

A perennial undershrub, found all over the hotter parts of South India. The stems yield a good fibre, said to be suitable for higher textile purposes. (Dr. Watt's Comm. Prods.)

58. **Sida cordifolia**, *Linn.* N.O. Malvaceæ.

Tel. Muttava, Chiribenda, Tettagorrachettu, Tellaantisa.
Hind. Kungyi, Khareti, Bariar.

A small annual or perennial weed, found in moist places all over South India. The plant yields a good, white fibre said to be suitable for higher textile purposes. (Dr. Watt's Comm. Prods.)

59. **Sida rhombifolia**, *Linn.* N.O. Malvaceæ.

Tel. Athiballachettu. *Hind.* Swetberela, Sahadebi.

A small shrubby plant found all over South India. The plant yields a good white fibre said to be suitable for higher textile purposes. (Dr. Watt's Comm. Prods.)

60. **Spatholobus Roxburghii**, *Benth.* N.O. Leguminosæ.

Hind. Mala, Mula, Maula.

A common gigantic climber of the forests of the Sub-Himalayan tract. It also occurs in the forests of the Konkan. The bark yields a fibre which is used for making ropes and bowstrings. (Watt's Dy.)

61. **Sterculia colorata**, *Roxb.* N.O. Sterculiaceæ.

Tam. Malambarutti. *Tel.* Kārupāyu, Kāruchiche, Gudilapu, Kondatāmara.
Hind. Bodula, Walena, Samarri. *Kan.* Bilisulige, Kodagili.
Mal. Malamparatti.

A tree, common all over South India. The bark yields an inferior fibre. Used occasionally for ropes. (Dr. Watt's Dy.)

62. **Sterculia guttata**, *Roxb.* N.O. Sterculiaceæ.

Tam. Kawili. *Kan.* Bikro, happusavaga.

A tree, common on the Eastern and Western Coast of South India. The bark of the younger parts of the tree abounds in a very strong white flaxen fibre. The natives of the lower Coast of the Wynaad make a coarse clothing out of this. The fibre is very well adapted for cordage and the making of coarse paper. (Dr. Watt's Dy.)

63. **Sterculia populifolia**, *Roxb.* N.O. Sterculiaceæ.

Tel. Dālibūdi.

A small tree, common in the Deccan and the Northern Circars, usually among rocks. The bark yields a good fibre. (Gamble's Timbers.) Used occasionally for ropes.

64. **Sterculia urens**, *Roxb.* N.O. Sterculiaceæ.

Hind. Gūhū, Kūlū, Gūlai, Gulu, Tabsi, Kanai, Bali, Tanuku
Tam. Chendālai, Chendānakku, Chigapputtanakku, Kāvalam, Pūttāli, Tanakku, Vellaipputtāli.
Tel. Erraponaku, Kavile, Ponaku, Tanuku, Tapasi.
Kan. Bhūtaili, Kempudaili, Pīnāri, Punikē.
Mal. Tonti.

A large tree of the dry forests of South India, chiefly on stony hills. The inner bark yields a fibre used for ropes. (Dr. Watt's Dy.)

65. **Sterculia villosa**, *Roxb.* N.O. Sterculiaceæ.

Hind. Udal, Udar.
Tam. Ānainar, Murattan, Ōdal, Tanakku, Vakkunār.
Tel. Kavile, Kummarponaku, Nāraponaku, Ponaku.
Kan. Bilidaili, Bilināru, Kaidaili, Kalsāvige, Mashi, Pulukusāvige, Savige, Tevaru, Āmenār.
Mal. Chavali, Vakku.

A tree, common all over South India, abundant on the Anamalais. The inner bark yields a strong and whitish-pink fibre, which is rather coarse and of a peculiar net-like appearance, and strips off from the tree in long, broad flakes. The fibre is used for elephant drag harness, tying the rafters of native houses and for tying bamboo and firewood bundles, and for making bags and cattle-halters. (Watt's Dy.)

66. **Tetrameles nudiflora**, *R. Br.* N.O. Datiscaceæ.

Kan. Bolur, Jermala.

A large deciduous tree, which attains a height of 100 to 150 feet, found in North India and the Western Ghats. The fibre is obtained from the stem. The uses of it are not known.

67. **Trema orientalis**, *Bl.* Indian Nettle Tree or Charcoal Tree. N.O. Urticaceæ.

Tam. Ambarātti, Karrippalā, Mondālai, Munnai, Ōman, Āyālai.
Tel. Āva, Budumuru, Chēkaminău, Kākamushti, Morali, Priyālu.
Kan. Hōme, Kādubaja, Kiruhāle.
Mal. Āmi, Malantolali, Ōmi, Pottami, Puni.

An evergreen tree, common all over South India, except in very dry tracts. The inner bark yields a long light brown fibre which strips off the stem in narrow thin bands. Used for tying the rafters of native houses and for binding loads ; in Assam for coarse cloth. (Watt's Dy.)

68. **Ventilago calyculata**, *Tulasne.* N.O. Rhamneæ.

Hind. Raidhani. *Tel.* Errachiratalatīge.
Kan. Haruge.

A shrubby climber, common in the Northern Circars and the Deccan. The bark yields a good fibre used for cordage. (Watt's Dy.)

69. **Yucca gloriosa**, *Linn.* Adam's Needle. N.O. Liliaceæ.

An evergreen American tree introduced into India and naturalized in many parts of the Madras Presidency. The leaves yield a wiry, strong and even fibre. Said to form a substitute for aloe fibre. (Watt's Dy.)

COTTON FIBRES.

"COCANADA" COTTON.

From Kistnà.

1. **Gossypium Nanking.** *Var.* Nadam. N.O. Malvaceæ.
Tel. Yerrapaththi.

Cotton in capsule from Sattanapalle, Kistna. This is a fairly strong stapled cotton but of a pronounced red colour. It thus does not do for white yarns but it takes dye excellently.

2. Ginned cotton from the same place as above.

3. Ginned cotton from Reddipalaiyam, *Kistna district.*

"NORTHERNS" COTTON.

The name "Northerns" as applied to cotton in this Presidency is given to the indigenous cotton which is grown in the taluks of Dhone, Kurnool, Nandikotkur, Nandyal, Sirvel, Koilkuntla and Markapur in Kurnool District, the Native State of Banganapalle in the same district, Jammalamadugu and Proddatur taluks in the district of Cuddapah and Tadpatri taluk in Anantapur district.

The crop is cultivated on both black and red soils and always drilled. On the black soil it is usually sown in August-September with a small admixture of horse gram (Dolichos biflorus), and is succeeded in the following year by sorghum mixture with green gram (Phaseolus mungo). On the red soils it is sown a little earlier and is usually mixed with Italian millet—two lines of millet to one of cotton. In this case also the succeeding crop is usually sorghum mixed with one or more pulses.

"Northerns" Cotton is in the main, a mixture of varieties of the two species Gossypium herbaceum and Gossypium indicum; on the black soils, herbaceum is, as a rule, the predominating species in the mixture. On red soils indicum is the chief ingredient of the mixture. Other cottons are also found but only to a slight extent. These are chiefly G. hirsutum (Cambodia and Dharwar American) and G. neglectum (Gogupatti—Telugu; Pulichai—Tamil). (Agc. Journal, Vol. XIV, Part II.)

Picking normally begins in February and continues into April. The operations is done very badly. The following are the exhibits of Northerns:—

1. From Kurnool, Gossypium obtusifolium. *Var.* Tellapaththi. N.O. Malvaceæ.
Tel. Tellapaththi.

(1) Cotton in capsule from Nervada.

Tellapaththi is a naturally produced hybrid between Uppam and Bourbon cotton that is *G. herbaceum* and *G. purpurescens.*

(2) Ginned Cotton of 4. From Nervada.
(3) Cotton in capsule from Madikera.
(4) Ginned Cotton from Madikera.
(5) Country Cotton thread, Madikera.
(6) Gossypium Nanking, *Var.* Nadam. N.O. Malvaceæ.
Tel. Yerrapaththi.
(7) Country cotton thread from Nervada.

From Bellary.

(1) Gossypium obtusifolium, Hybrid race. N.O. Malvaceæ.

Tel. Javaripaththi.

(1) Cotton in capsule from Manandakottam, *Bellary.*
This is the same as Tellapatti—a hybrid between *G. herbaceum* and *Gy. purpurescens.*
(2) Ginnned cotton of 1.
(3) Cotton in capsule from Sandanakkal, *Bellary.*
(4) Ginned cotton of 3.
(5) Country thread.
(6) Man's cloth.
(7) Dhubatee.

From Cuddapah.

(1) Gossypium obtusifolium Hybrid race. N.O. Malvaceæ.

Tel. Tellapaththi.

(1) Cotton in capsule from Masanapalle, *Cuddapah.*
(2) Ginned cotton of 1.
(3) Country thread of Masanapalle, *Cuddapah.*
(4 and 5) Man's cloth, Proddatūr, *Cuddapah.*
(6) Woman's cloth, Proddatūr, *Cuddapah.*

From Coimbatore.

(1) Gossypium herbaceum. N.O. Malvaceæ.

Tam. Ukkam Paruththi.

(1) Cotton in capsule, Avarampalaiyam, *Coimb.*
(2) Ginned cotton of 1.
(3) Cotton in capsule, Palladam, *Coimb.*
(4) Ginned cotton, Palladam, *Coimb.*
(5) Cotton in capsule, Puthur, *Coimb.*
(6) Ginned cotton, Puthur, *Coimb.*
(7) Cotton in capsule, Ganapathi, *Coimb.*
(8) Ginned cotton, Ganapathi, *Coimb.*
(9) Country thread, Ganapathi, *Coimb.*
(10) Cloth used as sheets or blinds, Ganapathi, *Coimb.*
(11) Cotton in capsule, Vilangkurchi, *Coimb.*
(12) Ginned cotton, Vilangkurchi, *Coimb.*
(13) Woman's cloth, Vilangkurchi, *Coimb.*
(14) Gossypium Nanking. N.O. Malvaceæ.
Var. Nadam.
Tam. Nadam Paruththi.
Tel. Paththi, Rather inferior cotton good for dyeing, *Coimbatore.*
(15) Woman's cloth, Tirupur, *Coimb.*
(16) Woman's cloth, Totipalaiyam, *Coimb.*
(17 and 18) Woman's cloth, *Coimb.*
(19 and 20) Country thread, Tirupur, *Coimb.*
(21) Gossypium pupurescens, *Poiu* N.O. Malvaceæ, Bourbon Cotton Cotton in capsule, Sathmakur, *Coimb.*
(22) Ginned Bourbon Cotton, Sathmakur, *Coimb.*

Bourbon cotton seed is naked. The plant is perennial. It is easily hybridized and fuzzy seeds are easily produced in the hybrids.

"Tinnevellies" Cotton.

The Tinnevelly tract comprises the three southernmost districts of the Madras Presidency. Cotton is here cultivated on an area of about 600,000 acres. The tract is bounded on the north by the Periyar irrigation project, on the east and south by the sea and on the west by the ghats. The compact and somewhat isolated position of the tract largely accounts for its individuality, for the conditions obtaining here differ in many respects from those in cotton tracts of other parts of India.

"Tinnevellies" cotton is essentially a dry land crop cultivated under unirrigated conditions on black soil of varying depth and natural fertility. It is, in reality, a mixture of two distinct varieties of cotton known locally as Karunganni (*Gossypium obtusifolium*, Gammie) and Uppam (*Gossypium hebaceum*). Karunganni is more commonly cultivated in the south and Uppam in the north. In the central parts mixtures of these are found but stray plants of either variety may be found in almost any cotton field. The distribution of these two varieties is believed to be a natural one determined by the habitat best suited to each.

The cotton is sown in October-November with the north-east monsoon rains and harvested between March and August. It averages about $\frac{7}{8}$ inch in length. It gives an average lint outturn of 25 per cent and an average acre yield of about 300 lb. of seed cotton. It has a slight creamy colour and strong. It is one of the most highly-prized of Indian cottons and one of the few which are suitable for mixing with "American"; it commands from 1*d.* to $\frac{3}{4}$*d.* per pound lower price than Middle American. (Agc. Journal, Vol. XIV, Part II.)

The following are the exhibits of "Tinnevellies" cotton:—

(1) Gossypium obtusifolium, Gammie. N.O. Malvaceæ.
Tam. Karunganni Paruththi.

(1) Cotton in capsule from Malaithattaparai, *Tin.*
(2) Ginned cotton from Malaithattaparai, *Tin.*
(3) Cotton in capsule from Thattaparai, *Tin.*
(4) Ginned cotton from Thattarai, *Tin.*
(5) Cotton in capsule from Malakarandai, *Tin.*
(6) Ginned cotton from Malakaramdai, *Tin.*
(7) Cotton in capsule from Ottappidaram, *Tin.*
(8) and (9) Ginned cotton from Ottappidaram.
(10) Cotton in capsule from Ottappidaram, *Tin.* *Tam.*—Vellaikanni Paruththi.
Ginned cotton, Vellai Kanni Paruththi, Ottappidaram, *Tin.*

(11) Gossypium herbaceum. N.O. Malvaceæ.
Tam. Uppam Paruththi.

(12) Cotton in capsule from Mesalur, *Tin.*
(13) Ginned cotton from Mesalur, *Tin.*
(14) Cotton in capsule from Masarapatti, *Tin.*
(15) Ginned cotton from Masarapatti, *Tin.*
(16) Cotton in capsule from Malakaramdai, *Tin.*
(17) Ginned cotton from Malakaramdai, *Tin.*
(18) Cotton in capsule from Chinnaperali, *Tin.*
(19) Ginned cotton from Chinnaperali, *Tin.*

(20) Cotton in capsule from Periyaperali, *Tin.*
(21) Ginned cotton from Periyaperali, *Tin.*
(22) Gossypium hirsutum. N.O. Malvaceæ.
Cambodia Cotton. Government Agricultural farm, Kovilpatti.
(23) Country thread from Sengapadai, *Madura.*
(24) Country thread from Tirumangalam, *Madura.*

Mysore Cotton.

Cotton is not an important crop in this State. The ordinary native cottons of Mysore are probably similar to the cotton varieties of Madras, viz., forms of *G. herbaceum* or uppam and *G. Nanking* or *Nadam*, cottons. There is nothing very remarkable to be said about the cultivation pursued.

The principal districts in which cotton is grown are Chitaldrug, Tumkur, Mysore and Shimoga.

The following are the exhibits from Mysore :—

(1) Cotton in capsule Hiriyur, Chitaldroog, *Mys.*
(2 and 3) Ginned cotton from Chitaldroog, *Mys.*
(4) Cotton in capsule Metikurki, Chitaldroog, *Mys.*
(5) Country thread Metikurki, Chitaldroog, *Mys.*
(6) Dhupattee—Samuthrathahalli, Chitaldroog, *Mys.*

Various Types of Cotton.

1. Salem or Uppam Cotton.

The so-called Salems is grown in the districts of Coimbatore, Salem and Trichinopoly. It merges on towards the Tinnevelly tract. The race of cotton is G. herbaceum. The characteristic of this cotton are short staple about ½ inch to ⅝ inch but very good pure white colour. More suitable for weft than for warp. Best grades lose 10 per cent in spinning ; lower grades are fluffy and lose up to 14 per cent.

2. "Northerns" Cotton.

See "Northerns" cotton with exhibits from Kurnool, Cuddapah and Bellary.

The characteristics of this cotton are as follows :—Strong stapled white cotton capable of spinning warp yarn up to 24's counts or mixed with Cambodia up to 30's. Loss in weight in spinning 16—20 per cent.

3. "Westerns" Cotton.

Fairly strong white staple and can easily spin warp yarn up to 20's counts. Mixes very well with northerns. Loss in weight in spinning 16—20 per cent.

3 & 4. Mixed Bourbon and Pure Bourbon Cotton.

See Bourbon cotton under the exhibits from Coimbatore.

Books consulted in general :

Cotton growing in India—Report by Arno Schmidt, Secretary on his second visit to India, Dec. 1911—Jan. 1912.

(International Federation of Master Cotton Spinners' and Manufacturers' Associations.)

Agricultural Journal of India, Vol. XIV, Part II.

MATS AND MATTING.

1. Pandanus odoratissimus, *Linn.* N.O. Pandaneæ.

Tam. Thalay, talai. *Tel.* Mugalik.
Hind. Kenta. *Mal.* Kaida, thala.

A much-branched screw pine, shrub or small tree with numerous aerialr oots. Common all along the sandy coasts of South India. The leaves are cut into pieces and softened. Coarse and fine varieties of mats are woven from these pieces. Where the softening has been done well, there we get a fine soft mat. The exhibits are from Travancore.

2. Bamboo mat.

See under Bamboo and bamboo articles, page 129. The article is from Travancore.

3. Aloe Fibre mat—Agave americana, *Linn.* The American Aloe. N.O. Amaryllideæ.

Tam. Anaikkatrashai. *Tel.* Rakashimatalu.
Hind. Rakas pattah, banskeora, hathisengar.

See 8. Fibres and Fibre yielding materials, page 134.

4. Coir mat—Cocos nucifera, *Linn.* N.O. Palmæ.

See article 30 under fibres and fibre yielding materials, page 139.

5. Mat made of Kusa grass—Eragrostis cynosuroides, *Beauv* N.O. Gramineæ.

Tam. Darbai. *Tel.* Darba, kusadarba, dabha,
Hind. Dab, Dab, Durva, Davoli. durpa, aswalayana.

A strong perennial grass with far creeping rhizomes common in the waste lands in the drier regions throughout South India. The article is from Gōdāvari.

6. Mat made of plantain leaf stalk, **Musa sapientum.** *Linn.* The Plantain. N.O. Scitamineæ.

Tam. Valai, Vazhaippazham. *Tel.* Arati, aruti, ariti, Kommu ariti, nalla ariti, chakrakeli ariti, bonta ariti Kadali.

Hind. Kela, Kach-kula, Maoz-kula. *Kan.* Bālē, bālēnaru.

A perennial herb of 8 to 15 feet in height, extensively cultivated throughout South India, nearer the coast tracts than inland, chiefly for its fruit and leaves. The perennial habit is kept by means of a thick rhizome. The leaf stalks and bases are very thick. The leaf bases contain fibres. The leaf base is kept stretched and with an iron scoop the pulpy matter is removed. Fibres are washed so that all the pulpy matter is removed. Fibres are allowed to dry in shade. The plantain fibre is pretty strong and with a dozen of them a rope of sufficient strength is produced (Royle). The fibres are very useful in making mats.

The article is from Travancore.

8. **Mats made of the Sedge—Cyperus corymbosus.** *Rottb.* The Sedge. N.O. Cyperaceæ.

Beng. Gola methi. *Tel.* Goddu tunga Kodu.

A common plant in wet soils throughout South India.

"Dr. Bidie writes—Several Species of sedge appear to be used for mat-making, but the one from which the finest sorts of mats are manufactured at Tinnevelly and Palghat is Cyperus Pangorie. Tinnevelly mats of the first quality are generally uncoloured or with one or two simple bands of red and black at each end and they may be made so fine that a mat sufficient for a man to lie on can be rolled up and packed into the interior of a moderate sized walking stick. The strips of the split sedge used in the Palghat matting are not so fine as those employed in Tinnevelly and the article is therefore heavier, coarser in texture and not so flexible."

Mats from Sedge are also manufactured at Wandiwash, North Arcot district.

(Book consulted in general Watts' Dy.)

BRUSHES.

1. **Aristidia depressa,** *Retz.* N.O. Gramineæ.

Tel. Nalla-Putiki.

Common in the dry barren parts of South India. The culms are used for making brooms.

2. **Aristidia setacea,** *Retz.* N.O. Gramineæ.

Tam. Thodapga-pullu. *Tel.* Shipurgaddi.

Common in the dry barren parts of South India. Grows side by side with Aristidia depressa. Brooms made from its culms are exhibited. Culms are used for making other articles also, such as tatties for frames in connexion with paper manufacture, etc.

3. **Agave americana,** *Linn.* The American Aloe. N.O. Amaryllideæ.

Tam. Anaikkatrashai. *Tel.* Rakashimatalu.

Hind. Rakas-pattah, banskeora, hathi-sengar.

See under 8. Fibres and fibre yielding materials, page 134. Scrubbing brush made of its fibre is exhibited.

4. Same as 3.

Paint brush made of its finer fibres is exhibited.

5. **Borassus flabellifer,** *Linn.* The Palmyra palm. N.O. Palmæ.

Tam. Panai, Panam, Panamaram.

Tel. Pottu tatti, tattichettu. *Hind.* Tāl, tāla, tār, tāri.

Kan. Tāle, tālā, pane mara.

For further description see under 21 of fibres and fibre yielding materials, page 136.

The following brushes made from its fibre are exhibited :—

1. Bush ordinary.
2. Brass Broom.
3. Banister.

6. Caryota urens, *Linn.* Sago Palm, Hill Palm. N.O. Palmæ.

Tam. Irampanai, Kūndarpanai, pūgam, Tālam. *Tel.* Bakini, jivalaggu, jīluga, Marī.
Hind. Mari. *Kan.* Bayne, Indu.
Mal. Anappana, Chūntappanai, Īrampana, Kalapanā.

For more information, see under fibres and fibre yielding materials, article 28, page 138.

Article exhibited is a scrubbing brush made of its fibre.

7. Cocos nucifera, *Linn.* The Coconut palm. N.O. Palmæ.

Tam. Tenna, Tenga. *Tel.* Tenkaya, Kobbari.
Hind. Nārel, Nāriyel. *Kan.* Tenginagida.

For more information, see under fibres and fibre yielding materials, article 30, page 139.

The following brushes made of its fibre are exhibited :—

1. Ordinary brush.
2. Brushes used in whitewashing in South India.
3. Banister.
4. Brush used in weaving.
5. Brushes used in painting.

8. Phœnix sylvestris, *Roxb.* Wild Date Palm. N.O. Palmæ.

Tam. Peria-eetcham. *Tel.* Ita, Pedda īta.
Hind. Khajur, Khagi, Salma, thalma, thakil. *Kan.* Ichal, Kullu.
Mal. Inta, Intappana, Kattinta.

For more description, etc., see under fibres and fibre yielding materials, article 54, page 144.

The exhibit is a broom made from the leaves of the plant.

9. Pandanus odoratissimus, *Linn.* N.O. Pandaneæ.

Tam Thalay, Talai. *Tel.* Mugalik.
Hind. Keura. *Mal.* Kaida, thala.

A much-branched screw pine, shrub or small tree with numerous ærial roots. This is common all along the sandy coasts of South India. The ærial roots are used for making brushes used in white-washing. The fibres of the leaves are used in making nets, sacks and brushes also.

MISCELLANEOUS DOMESTIC ARTICLES.

1. Receptacle for water made of bottle gourd.

Lagenaria vulgaris, *Seringe.* Bottle Gourd. N.O. Cucurbitaceæ.

Tam. Sorakkai, Shora Kai. *Tel.* Kunda ruga, Ānapu chettu, Sorakaya.

Hind. Cultivated form—Kaddu, al-Kaddu, gol kaddu, Kashīpal ; wild form—tumn and titalan. *Kan.* Sorai Kayi.

A climbing plant, wild and cultivated, common in South India. The fruits assume various forms as a result of cultivation and the fruit sometimes reaches as much as six feet in length.

The fruit is noted for its hard rind and it is therefore much used as water bottles. (Watt's Dy.)

(Cases) Receptacles for snuff, sacred ashes, etc., made of coconut shell from Madura and Tinnevelly. **Cocos nucifera,** *Linn.*

For information on coconut, see article 30, under fibres and fibre yielding materials, page 139.

3. Receptacle for snuff made of Bael Fruit from Kistna. **Aegle Marmelos,** *Corr.* The Bael or Bengal Quince. N.O. Rutaceæ.

Tam. Vilva. *Tel.* Bilva.
Hind. Bèl. *Kan.* Bilpathre.

Mostly cultivated and occasionally wild in South India. It is a small tree armed with strong straight sharp spines. It is valued for the medicinal properties of its fruit.

4. Rattan baskets from South Kanara. **Calamus rotang,** *Linn.* N.O. Palmæ.

Tam. Perampu. *Kan.* Bettha.

An extensive climber found in the forests of the Deccan, Western ghats, etc. The slender stems are used for basket and wicker work, chairs, mats, blinds, etc.

5. Flower baskets made of thatch grass. **Saccharum spontaneum,** *Linn., Ment.* N.O. Gramineæ.

Tel. Rellu-gaddi, verricheruku, kaki veduru, kore-gadi.
Hind. Kāns, kagara, kosa, kus, kas.

A tall erect grass, reaching sometimes 20 feet high. It is common in moist localities in South India. The leaves are manufactured into ropes, mats, baskets, etc.

6. Trays made of the leaves of Saccharum spontaneum.

7. Cigar case made of Saccharum spontaneum.

8. Fan made of corypha taliera leaves from Chingleput district. **Corypha Taliera,** *Roxb.* N.O. Palmæ.

Tam. Kottaip-panai, codda pani. *Tel.* Shritalam.
Kan. Bive, shritale, tale. *Beng.* Tara, talier, tarit.

The palms belonging to this genus are all tall, stout and unarmed. They die after a period of 20 or 40 years. They flower once just before they die. They have very large leaves and small hermaphrodite flowers. The particular species Taliera is a native of the North Eastern Coast of Madras, especially in Coromandel. (Gamble's Timbers.)

9. Fisherman's cap made of Corypha Taliera leaves, Chingleput.

10. Box made of Corypha Taliera leaves from Chingleput.

11. Casket for betal leaf made from the leaves of the Palmyra from Tinnevelly.

Borrasus flabellifer, *Linn.*

See article 21 under fibres and fibre yielding materials, page 136.

12. Basket made of Palmyra leaves for holding betal leaves and areca nut from Kilakarai, Rāmnād district.

13. Basket made of Palmyra leaves for holding betal leaves from Nagore, Tanjore district.

ARTICLES DERIVED FROM THE COCONUT PALM.

1. *Trough.*—Trough made of coconut tree used for catching water drawn from a well.

2. *Buttons.*—These are samples of buttons made of coconut wood at Travancore.

3. *Adapter.*—(Nola) Piece of the adapter used for connecting the native still to the condenser.

4. *Rafter.*—This is made of the lower part of the tree 10, 20 and 25 feet in length. It is used for building purposes, especially in villages.

5. *Drum.*—This is made of a piece of the trunk of the coconut tree.

6. *Paper cutter.*—This is made from the wood of the coconut tree at Travancore.

7. *Plate.*—This is made of the wood of the coconut tree.

8. *Fish trays.*—This is made from the midribs of the coconut leaves. The article is from Travancore.

9. *Bats.*—Bats for cricket are made of the wood of the coconut.

10. *Doormat.*—This is made of the midribs of coconut leaves.

11. *Ladles.*—In making this the shell and a piece of the wood of the coconut tree are employed. It is used by Indians for taking out oil for daily use from an earthern vessel containing the monthly or yearly stock. It is not corroded by the oil.

12. *Strainer.*—The sheaths by which the leaves are held firm to the stem are used for straining toddy and coconut milk and for general straining in the cook room.

13. *Sarangi.*—This is the violin used by street beggars. It is made from the shell and piece of wood of the coconut tree.

14. *Toy parrot.*—This is made by children of the leaf of the palm. When fresh it looks very good. It is common in South India.

15. *Bangles.*—These are made from the shell.

16. *Blind or Blinka* (*Dol-Dhapan*).—This is used for covering the eyes of bullocks and buffaloes while yoked to oil mills, etc.

17. *Scoops.*—This is made of the coconut shell. The round and deep ones are used as drinking cups.

18. *Splints.*—This is made of the spathe of the inflorescence used for this purpose by the toddy drawers.

19. *Fishing boat.*—Toy made from the spathe by the children of the fishermen.

20. *Oil bottle.*—The bottle is made from a deep and round shell and a coir rope is attached to its neck. It is hung beneath the labour cart with castor oil and brush in it for lubricating axles.

21. *Soap.*—Made of coconut oil. It is being manufactured to a large extent and with much success in the Government Soap Works at Calicut.

22. *Chain.*—This is made of the fine coir of the coconut and it is used to tie round the waist to retain the loin cloth. The size is for a child. It may be used also as a watch guard.

23. *Funnel.*—Made of the shell of the coconut.

24. *Snuff case.*—Made of the shell of the coconut.

25. *Hubble-bubble.*—Made of the shell. It is the hukah of the poorer classes. (Watt's Dy.)

26. *Coir articles.*—Articles made out of the fibre of the coconut.

See article 30 under fibres and fibres yielding materials, page 139.

i. From Kistna.—Mat for doorway.

ii. From Travancore—
(*a*) Green leaf tea bag.
(*b*) Samples of coir mat.
(*c*) Coir bag.
(*d*) Coir sack.
(*e*) Coir glove for cleaning cattle.
(*f*) Coir rope.
(*g*) Coconut husk used as a brush.
(*h*) Coir brush.
(*i*) Coloured samples of coir rope.
(*j*) Cleaned and uncleaned coir.

There are five photographs illustrating the manufacture of coir and coir yarn in Travancore.

The coconut husk is made to rot in water and it is beaten afterwards with hammers so that the fibres are separated. They are afterwards passed through machines with teeth which finely separate out all fibres. They are spun into yarn with the help of other machinery.

DOMESTIC ARTICLES MADE FROM THE FAN PALMS.

Borassus flabellifer, *Linn.*

(Arranged in a large tall show case in the centre of the second hall.)

Tam. Panai, panam, panamaram. *Tel.* Potu tati, tatichettu.

Kan. Tāle, Talā, pane mara. *Hind.* Tal, Tala, Tar, Tari.

For description, distribution, etc., see under article 21 of fibres and fibre yielding materials, page 136.

There are many domestic articles made out of the palmyra palm and the following are exhibited in the museum :—

1. Baskets of various sizes and designs, such as fruit baskets, fish baskets made of the leaves of the palm.

2. Boxes of different sizes and patterns to hold betel leaves, toilet articles, etc.

3. Umbrella made of the leaves of the Palmyra.

4. Hat umbrella made of the leaves of the talipot palm, *Corypha umbraculifera*, Linn., Malabar.

Corypha umbraculifera, *Linn*—

5. Mats of the various sizes made of the leaves of the palm.

6. Caps used by fishermen, made of the leaves of the palm.

7. Hats made of the leaves of the palm.

8. Sandals made of the leaves of the palm and used by very poor people in summer.

9. Writing books. These are made of the clean thick leaves of the palm. Letters are written with an iron style. These books have been in use in India from a very long time and even to-day these books are used in village schools and by village pandits.

10. Plates and children's rattles are made with the leaves of the palm.

11. Fans of different pattern, made with the leaves of the palm.

12. Brooms are also made of the leaves of the palmyra.

13. Cordage is obtained from the fibres of the leaf stalks.

14. Spoons are made from the stones of the plant.

15. Brushes are made with the fibres extracted from the stem of the plant.

16 The root end or the expanded bottom portion of the trunk is hollowed out to form a water bucket. It is used in a picotah or water lift in South India.

ANIMAL PRODUCTS.

SILK.

The Silk industry is a very ancient industry in India. So far as Madras Presidency is concerned it is known that this industry was started during the time of Tippu Sultan, who, it appears, sent a man from Trichinopoly to Bengal to study this industry. The climate of the Madras Presidency does not seem to favour very much the working of this industry to a large extent. At present Mysore is producing the best silks of South India. Great credit is due to the Salvation Army of Tata's Silk Farm, Bangalore. Silk is manufactured to a large extent in Bengal, Kashmir, Assam, Punjab, Baroda, etc. (Dr. Watt's Comm. Prods.) The silk of commerce is the thread employed by certain species of moths of the families of Saturniidæ and Bombycidæ for the formation of their cocoons.

Silk is formed in the body of the insect as a fluid in the salivary glands which open by two minute apertures on the apex of the lower lip. Silk is poured out as a thick gummy fluid usually transparent which rapidly hardens and dries assuming then a tint of buff, yellow or brown. When used in cocoon-making the insect spins a continuous thread at first on the object to which the cocoon is fixed, later building up the cocoon of continually added threads. The cocoon is built up from inside, the outside irregular layer first and the fine inner layers last.

Silk Moths.

There are two kinds of moths, namely, the mulberry and the non-mulberry feeding moths. The mulberry feeding ones belong to the Bombycidæ while the non-mulberry feeding ones belong to the Saturniidæ. The silk moths are arranged in a show case.

1. Attacus atlas, *Linn.*

A wide silk worm found in many parts of India besides Burma, Ceylon, Java, China and other parts of Southern Asia. It feeds upon a large number of different plants, but is not cultivated for its silk which however is said to have a considerable market value when obtained in sufficient quantity. The cocoons of this moth are unreelable. They are carded and combed and spun into yarn like cotton. (Watt's Dy.)

2. Bombyx fortunatus, *Hutton.* (The "Desi" or "Chotapalu.")

A domesticated race of Bombyx mori. This is a mulberry silk worm largely reared in Bengal where it yields the principal cold weather crop of cocoons. It produces several generations a year. (Dr. Watt's Comm. Prods.)

3. Bombyx arracanensis, *Hutton.* The Nyapaw of the Burmans.

A multivoltine silk worm, reared in Arakan and Burma. It produces several generations a year. Its cultivation in Burma is slovenly and dirty. The manipulation of the silk and the manufacture of the resulting fibre are alike indifferent, so that the industries

connected with this worm are merely of local interest. (Dr. Watt's Comm. Prods.)

4. Bombyx sinensis, *Hutton.* "Sina" or "Chota Pat."

A small multivoltine, mulberry feeding silk worm reared in Bengal. Its silk is inferior to that of the "Desi" or the "Madrasi" and its cultivation is being practically abandoned. The cocoons vary in colour from being white, yellow or greenish coloured. (Dr. Watt's Comm. Prods.)

5. Bombyx cræsi, *Hutton.* "Nistri" or "Madrasi."

A multivoltine mulberry silk worm, reared in Bengal and Assam. It is second in importance to the "Desi" variety. It thrives well in the hot season. The cocoons are generally yellow at least externally and are somewhat larger than those of the "Desi" but the fibre has less elasticity and brilliancy. (Dr. Watt's Comm. Prods.)

6. Bombyx textor, *Hutton.* "Boro polo" or "Large Pat."

An annual mulberry silk worm reared in Bengal, Assam and China. Owing to the fact that it produces but one crop of cocoons in the year that its eggs do not hatch simultaneously, its cultivation has been almost abandoned. But the cocoons of this are flossy and not hard like the Bombyx mori cocoons. And the eggs of this do not require such intense cold as the eggs of Bombyx mori for their hibernation. (Dr. Watt's Comm. Prods.)

7. Bombyx meridonalis.

This is probably only a variety of the "chota pat." It is reared in Mysore and Kollegal. It yields 7 or 8 crops of cocoons in the year instead of one. The cocoons are greenish white and almost as good as Barapalu ones.

8. Bombyx mori, *Linn.* Cocoons.

An annual mulberry feeding silk worm reared in Europe, China, Japan, Kashmir, and some of the Western Asiatic countries. (Dr. Watt's Dy.)

The exhibit is from the Salvation Army Sericulture Farm, Bangalore.

9. Bombyx mori, *Linn.*

Cocoons reared in Calcutta from French seed.

10. Bombyx mori, *Linn.* Cocoons reared in Japan.

11. Bombyx mori, *Fabr.*

The annual or Cashmere Worm. This is the common mulberry feeding silk worm reared in Japan, China, Bokara, Cashmere, Afghanistan, Persia, Southern Russia, Turkey, Egypt, Algeria, Italy, France, Spain, United States of America and to a small extent in the Punjab and North-West Provinces of India. (Dr. Watt's Dy.)

12. Rhodia newera, *Moore.*

A wild silk worm found upon a species of weeping willow in Sikkim and Nepal. The silk is not made use of in any way. (Watt's Dy.)

13. Antheræa paphia, *Linn.* Tasar Silk Worm.

A native of China, India and Ceylon. It is distributed all over Northern India, from Nepal and Assam down to Gōdāvari of the Madras Presidency. It is also found in Mysore. The insect is pale brownish yellow. The worms feed on a large number of plants among which the following may be mentioned : (1) Anogeissus

latifolia, dhaura, (2) Bassia latifolia, (3) Carissa carandus, (4) Eugeina jambolana, (5) Ficus religiosa, (6) Shorea robusta, etc.

The silk worm is bivoltine or quadrivoltine. The industry is now declining everywhere. (Dr. Watt's Comm. Prods.)

14. Antherœa Assama, *Westw.* "Mooga."

A semi-domesticated multivoltine silk worm, largely reared in Assam in the open air upon the sun-tree Machilus odoratissima. It may be fed on other trees also such as Cinnamomum obtusifolium, Michelia Champaca, Symplocos grandiflora and several species of Litsæa. The reeling is easy. The insects within the cocoons are killed by exposure to the sun or by fire. They are afterwards boiled in an alkaline solution. From 7 to 20 filaments are rolled together between the palm of the right hand drawn across the thigh while the left hand works the reeling apparatus. The silk is valuable and a considerable trade is carried in it. No part of the cocoon is rejected as useless. The floss plucked off from the outer surface of the cocoon before reeling is commenced, the shell that remains around the Chrysalis, and the cocoons from which the moths have escaped in breeding are all reserved to be carded and spun and the by-product thus obtained is called era and is often mixed with the Eri Silk. (Dr. Watt's Comm. Prods.)

16. Antherœa mylitta. The "Tusser" Worm.

A semi-domesticated multivoltine silk worm, largely reared in many parts of India, chiefly Bengal in the open air upon various trees amongst which are (1) The Daiyeti (Lagerstræmia indica), (2) The Bher (Zizyphus jujuba), (3) The Carinda (Carissa carandus), (4) The say tree (Terminalia tomentosa). The cocoon can be reeled and yields a large amount of valuable silk which is remarkable for its strength and durability. The silk is largely exported in the form of locally woven cloth. This together with the reeled silk and waste forms a considerable item of trade. (Mukherjee.)

17. Theophila Huttoni, *Westwood.*

A wild silk worm found feeding on indigenous mulberry trees in the North-West Himalayas. It has not been found possible to rear these worms successfully and in captivity and the silk is not made use of commercially at present. The worm is bivoltine in Mussooree. (Watt's Dy.)

18. Saturnia Simla, *Westw.*

A non-mulberry silk worm confined to the moist hill forest areas. It is to be found in the North-West Himalayas. It yields a silk, but this is not much made use of in commerce. The cocoons are dark and fenestrated.

19. Actias selene, *Hubn.*

A wild silk worm found in many parts of India besides Ceylon and China. The silk is not of great value. (Watt's Dy.)

20. Attacus ricini, *Boisd.* "Eri" silk worm.

A multivoltine silk worm, which is very much reared in Assam. It is also grown in Eastern Bengal, Darjeeling, Nepal, Puri, etc. It feeds upon the castor oil plant. The Assam silk of the bazaar is the product of this insect. The cocoon cannot be reeled. It is opened out crudely and spun. The spun thread though coarse is woven into textiles that are exceedingly durable. In fact "eri" is

stronger than wool, cotton, or mulberry silk. The European trade demands white "eri" cocoons and this somewhat restricts the supply; still there is a considerable trade in it in the form of woven silk, waste and yarn.

21. Cricula trifenestrata, *Helfer*. The "Amberi" or "Mango Silk Worm."

Very common in Assam. Its caterpillar lives upon the mango tree in lower Bengal and Burma; it is clothed in poisonous spines and therefore dangerous to handle. It forms an open net-like cocoon of a beautiful yellow colour and of a rich lustre, the silk being spun in the same manner as the Eri cocoon. The industry is being well tried in Burma. (Dr. Watt's Dy.)

22. Cricula trifenestra, *Helfer*. Cocoons and waste of this silk worm.

23. *Sample of Raw Tusser Silk prepared by Mr. F. Lotheri, Calcutta. Samples of Mulberry or China Silk from South India.*

(1) Raw Silk, *Mysore*—1845.
(2) White Silk, *Chittoor*—1840.
(3) White Silk, *Nilgiris*—1845.
(4) Silk from Italian Worms, *Nilgiris*—1849.
(5) White Silk, *Salem*.
(6) White Silk, *Tinnevelly*—First Quality.
(7) Do. do. —Second Quality.
(8) Straw Coloured Silk, *Nilgiris*.
(9) Silk from Bombay Worms reeled at *Madras*—1845.
(10) Raw Silk, *Salem*.
(11) Raw Silk, *Madras*—1845.
(12) Red Silk, *Tinnevelly*.
(13) Red Silk, *Salem*.

Samples of Silk from Mysore State.

(1) Silk reeled at *Channapatna* from boiled Cocoons.
(2) Silk prepared at *Channapatna*—First Quality.
(3) Silk waste.
(4) Silk prepared at *Channapatna*—Second Quality.
(5) Do. do. —Third Quality.
(6) Do. do. —Fourth Quality.
(7) Do. do. —Fifth Quality.
(8) White Silk, *Tumkur*—Mysore Province.
(9) Black Silk do. do.
(10) Green Silk do. do.
(11) Yellow Silk, *Tumkur*—Mysore Province.
(12) Red Silk do. do.
(13) Purple Silk do. do.

Miscellaneous Collections of Silk Cocoons and Silks.

(1), (2), (3), (4), (5), (6). Samples of Silk cloths presented by H.H. the Nabob of the Carnatic. (7), (8), (9), (10), Specimens of Silk cloth.—Trichinopoly.

(11) Tussar Silk, *Hyderabad*—First Quality.
(12) Do. do. —Second Quality.
(13) Black Tussar Silk, *Hyderabad*.
(14) Boiled Tussar Silk Cocoons, *Hyderabad*.
(15) Tussar Silk, *Tinnevelly*.

(16) Silk Cocoons and Silk from Mylitta Silk Mills Company. Madras. 1888—
(*a*) Silk from unboiled dark cocoons.
(*b*) Outer layer of double cocoons.
(*c*) Yellow cocoons dark boiled with suggimutti.
(*d*) Silk from mixed cocoons boiled with suggimutti.
(*e*) Silk from selected white cocoons (unboiled).
(*f*) Silk from mixed cocoons (unboiled).
(*g*) Tusser Silk from open cocoons, *Chingleput.*
(*h*) Tussar Silk spun by a native process.

Samples of Cocoons and Silk from Mysore Salvation Army Tata Silk Farm, Bangalore, 1917.

(17) Bombyx Mori Cocoons, *Mysore.*
(18) Spun Silk, *Mysore*
(19) Bleached Silk, *Mysore.*
(20) Waste Silk, *Mysore.*
(21) Rough Waste Spun Silk, *Mysore.*
(22) Fine Waste Spun Silk, *Mysore.*
(23) Attacus Ricini Eri Cocoons.
(24) French Cocoons.
(25) Eri Spun Silk.
(26) French Raw Silk.
(27) Various samples of silk cloth from Tata's Silk Farm. Bangalore. 1917.

EXHIBITS CONNECTED WITH THE MANUFACTURE OF WOOLLEN BLANKETS IN CHITTOOR DISTRICT.

The manufacture of woollen blankets is an indigenous industry in South India. The industry is carried on by the Indians chiefly in the following places, namely, Gōdāvari, Bellary, Kurnool, Anantapur, Kistna, Cuddapah, Nellore, North Arcot, South Arcot, Tanjore, Madura, Coimbatore, Salem and Trichinopoly. The industry is worked on improved lines only in the jails. The industry as it is worked by the Indians has a very simple process. The shorn wool is first well teased and spun. The spun wool is warped on pegs and fitted on to a country pit loom with no treadles. The strands are passed through gearing fitted into a wooden frame which the weaver works with his hand after passing each strand of the wool through the warp. The strands are forced close together by a wooden beam. The warps are made according to the size of the blanket required. The starch used for the blanket is made generally from the crushed tamarind seeds. On removal from the loom the blanket is steeped in boiling water to remove the starch and then rubbed with a rough brush. The superfluous wool is rubbed off, and it is then pegged out to the required size and handed over to the tailor to have the ends sewn over and to be brushed. (Monograph on Woollen Fabric Industry in the Madras Presidency.—Thurston.)

EXHIBITS FROM THE GOVERNMENT FISHERIES.

From ancient historic times South India has been famous for its trade in fish. Malabar is the chief place where the trade is carried on to a very large extent. The salted, sundried, and pickled fish from this place is exported even to foreign countries. The fish oil is also largely exported to foreign countries. It is prepared in the following manner. At certain seasons large quantities of sardines (*Clupea longiceps*) are caught on the West Coast. In 1909 the Fisheries Department introduced a simple process of boiling the fish in the open iron vats and pressing the oil from the boiled fish in a handscrew press The resulting cake makes a valuable fertilizer, known as fish guano and contains practically no impurities. The oil is a valuable article of commerce and is used in jute batching, leather tanning and other industries. Cochin and Calicut are the chief ports of export. (Handbook of Commerical Information, Madras, by M. E. Couchman, I.C.S. Government Press, Madras.)

1. **Sardine Oil (first class).** Skimmed when sardines (*Clupea longiceps*) are boiled in open iron vats. The price is Rs. 200—250 per ton. The oil is of great commercial value. It is used in leather tanning, jute batching and other industries. A great quantity is exported every year to foreign countries. Before the war, Germany was a great purchaser of this oil. (Handbook of Commercial Information, Madras, by M.E. Couchman, I.C.S.)

2. **Sardine Oil (second class).** Extracted by pressing the sardines (*Clupea longiceps*) after they are boiled. This is only second in value to the oil that is skimmed off when sardines are boiled in vats. The price is Rs. 120—175 per ton. This is also used for similar purposes as the oil of sardines (first class).

3. **Shark Oil.** Extracted by boiling the livers of the shark fishes. Only heavy livers are purchased from the fishermen, as the lighter ones yield a smaller proportion of oil. This oil is used in medicine as a substitute for cod-liver oil. (Dr. Watt's Comm. Prods.)

4. **Fish guano (unmilled).** The oil cake that is left after boiling and extracting the oil from the sardines (*Clupea longiceps*). The price is Rs. 70—90 per ton. A very valuable fertilizer.

5. **Fish guano milled.** Nearly the same as exhibit 4, differing from it only in the fact that this is milled and the other is not. Also used as a fertilizer.

6. **Fish manure.** Prepared by drying sardines in the sun. Thurston (Bull. Mad. Mus., 1900, No. 2, 120-3) gives much information on the extent to which sardine is employed as a manure. The price of it is from Rs. 25—50 per ton.

7. **Prawn shells.** These are dried and used as manure. The price of the manure is Rs. 55—50 per ton.

8. **Isinglass.** A glue manufctured from animal bodies. The air bladders of cat fish Anies sp. and the Lats sp. are used in the preparation of this glue known as Isinglass. (Dr. Watt's Comm. Prods.)

MINERAL PRODUCTS.

COAL.

Hind. Koyelah or Kuela. *Tam.* Simai Kari.
Tel. Simaboggu. *Mal.* Kari.
Kan. Iddallu.

Coal is mineralised vegetation. A great deal of it was formed during the carboniferous period in all parts of the world. There are evidences to show that a good many forests became buried at that time. The vegetation was thus entirely converted into the useful product coal.

The Indian coal does not belong to the carboniferous period. It is a formation of the Gondwana system or of the Triassic period. The fossil flora of this formation show the mesozoic types.

In South India the best field occurs in Singareni. The coal obtained from this place is of a fairly good quality. It answers well for smithy purposes and stationary engines. It serves well as fuel for the railways.

Coal is also obtained from the following places in South India :—

(1) Beddanol, 38 miles from Rajahmundry. The coal of this place is poor in quality.

(2) Damercherla, on the banks of the Gōdāvari near the borders of the Nizam's Dominions. The coal is fairly good in quality.

(3) Sasti and Paoni, in the Nizam's Dominions, included in the Wardha area. The coal obtained here is of good quality.

(Watt's Dy.)

SALTPETRE, NITRE, OR POTASSIUM NITRATE.

Tam. Pottil-uppu, Potluppu. *Tel.* Petleppu, Shura-kāram.
Kan. Petluppu. *Mal.* Veti-uppa, Sandawa.
Hind. Suriakhar, Shora, Shora Kalmi.

Saltpetre or potassium nitrate is an important salt which is found abundantly as a natural product in many parts of the world, chiefly South America, Spain, Persia, Hungary, but more especially India. Its principal use is in the manufacture of gun-powder of which it forms about 75 per cent.

The manufacture of this salt in this Presidency has been brought under the control of the Salt and Abkāri Department, because in the process a quantity of common salt is also produced, which varies according to the quality of the soil.

The salt occurs in the form of nitrous earth which is commonly found in and about village sites in India and it can be collected with very little cost. The first stage of manufacture is the production of brine. The earth is put in a sort of trough or cistern over a filter bed and water poured on to it. The water dissolves the salts in the earth and carries them through the filter into pots. The brine is then boiled until the saltpetre crystallizes. This product is called crude saltpetre. The manufacture of refined saltpetre from crude saltpetre is done in this way. The crude saltpetre is dissolved in

water and then boiled. In cool temperatures saltpetre and salt (sodium chloride) are equally soluble, but the former becomes the more soluble as the temperature rises and consequently sodium chloride deposits first. This is withdrawn from the liquid and when the sodium chloride has all deposited the water is allowed to cool. It is then removed from the boiler to a vat in which the sediment is allowed to settle, and is finally transferred to the crystallizing vats where the saltpetre crystals form as the liquor cools and the solubility of the salt diminishes. The crystals are collected from the vats and stored for sale. The educed salt, which was removed in the process of boiling, is kept under lock and key and destroyed by an officer of the Salt and Abkāri Department.

The season for manufacture continues on the average for six months.

The manufacture takes place chiefly in the following places in this Presidency :—

(1) Trichinopoly district.
(2) Coimbatore district.
(3) Madura district.

The chief use to which it is put is in the manufacture of gunpowder. It is also used in the manufacture of fireworks. In Northern India it is said to be used as a mordant, especially in the case of wooldyeing with animal colours such as lac or cochineal. It is also used in medicine.

(Dr. Watt's Dy. and Pamphlet on Saltpetre published by the Madras Salt and Abkāri Department.)

EARTHENWARE MATERIALS FROM MYSORE, NELLORE AND SOUTH KANARA.

There is at present very little that is interesting in the modern manufacture of pottery in South India, with the exception of the industry as it is being specially worked in a few schools. The Madras School of Arts, for instance, is working out this industry in a very satisfactory manner. The kind of pottery which is indigenous to South India is the coarse, unglazed earthenware manufacture in almost every village throughout South India, comprising vessels for water, culinary utensils, flower pots, tiles, etc. The exhibits are from Mysore, Nellore and South Kanara. In these districts as well as in Madura, South Arcot and North Arcot, the manufacture of earthenware materials is on a large scale. The earthenware articles are made almost from any kind of clay procurable on the spot which is neither properly ground nor tempered excepting by some in South Kanara, but is used in its natural state by most of the native potters. The colour of the articles is usually a light red colour. The specimens exhibited from South Kanara and Mysore are black. They are sometimes made from a dark coloured clay which turns dark when burnt; but very often from the same material as the red ware, the black colour being given by baking the articles in a huge vessel with its mouth closed and plastered with clay. White, grey and buff pottery is manufactured in places where superior kaolin can be obtained.

In Madras town there are several potters and the manufacture is comparatively large in scale.

The earthenware materials are used by all classes and castes of people in South India. Muhammadans, Brahmans, Sudras, and almost every caste and creed people use them for water, culinary purposes or for garden purposes.

(Books consulted in general—District Gazetteers of South Kanara and Mysore and Madras Pottery-Holder.)

STONE OBJECTS MADE MAINLY OF SOAPSTONE AND LIMESTONE.

Soapstone is a variety of the mineral known as steatite or talc. The latter is a soft magnesian or talcose mineral which has a soapy smooth feel. It occurs in subordinate beds of serpentine and chlorite schist, is usually of a greyish or yellowish-green colour, and has a laminated texture. Potstone is also ordinary soapstone which is more or less impure. Like most magnesian minerals it is little affected by heat and it is therefore used in the making of cooking utensils. It is also fashioned into gas burners, which possess the property of not corroding, nor becoming clogged up, as is frequently the case with those made of metal.

Occurrence in South India—Kurnool, Anantapur, North Arcot. Bellary, Cuddapah, Salem, Malabar, Vellore and South Kanara districts and Pudukkottai State.

Hind. Abrak. *Tam.* and *Tel.* Appracum.

Localities and articles.

From Somalapuram, Bellary district.

Two soapstone utensils are exhibited. The soapstone from this place is pale green. It cuts freely and in slices. It is a soft stone, fairly well free from grit.

From Harpanahalli, Bellary district.

The soapstone obtained from this locality is very much like what is obtained from Somalapuram.

The following articles are exhibited :—

1. Cooking utensils of different kinds.
2. House lamps.
3. Figure of Hanuman.
4. Nandi.
5. Lingam and Yoni.

From Tadpatri, Anantapur district.

Both soapstone and blackstone are obtained here. The following are exhibited :—

(1) Stone ruler.
(2) A receptacle which contained treasure.

From Vinukonda, Guntūr district.

Both soapstone and blackstone are obtained here.

The exhibits are pieces used in the chess game. They are made from both the stones.

From Mysore.

The soapstone is yellowish brown.
The exhibit is an utensil.

From Edamaranahalli, Coimbatore district.

The soapstone is pale green, and contains minute chloritic crystals.
Exhibit is a cooking utensil.

From Tirupati, Chittoor district.

The exhibit is a stone figure of Ganesa.

From Gōdāvari.

Sandstone figures of Lingam and Ganesa.

From Mysore.

A slab of sandstone that is used for grinding sandal paste.

From Tanjore.

Stages in the cutting of spectacle lenses made from rock crystal (Quartzpebbles).

From Palladam, Coimbatore district.

Spectacle lenses made from Rock crystal.

From Kurnool.

Exhibit is a carved slab of green marble.
The colouring of the marble is derived from the presence of accidental minerals, frequently metallic oxides.

From Tadpatri, Anantapur district.

The following are the exhibits :—

1. Marble mortar and pestle.
2. Marble cup and lid.

MICA.

Hind. Abrak. *Tam.* and *Tel.* Appracam.

The group of minerals known collectively under this name are silicates of aluminium with potassium and hydrogen, also often magnesium, ferrous iron, and in certain cases ferric iron, sodium, lithium; further rarely, barium, manganese and chromium. All micas yield water on ignition in consequence of the hydrogen (or hydroxyl) which they contain. Mica occurs as a primary and essential constituent of all igneous rocks and as an alteration product in other rocks. In South India it is mined in the Nellore district and Nilgiris and marketable mica is reported to be found in the Vizagapatam and Salem districts and in Coorg and Mysore States.

The micas are all characterized by their highly perfect basal clevage yielding very thin tough laminæ which are elastic. There are different kinds of mica with varying colours according to the base with which the silicate is combined. The potash mica or muscovite is colourless. The magnesium iron micas or biotite are black. There are also orange and green micas.

Mica being unaffected by high temperature is used for the windows of stoves, furnaces, etc., and being a bad conductor of electricity is used for insulation in electrical apparatuses. Being transparent it forms a good substitute for glass and is therefore used for domes, window panes, watch cases, etc.

(Book consulted in general—Dana—Textbook of Mineralogy and Watt's Dy.)

LITHOGRAPHIC STONES.

Limestones are used for the purposes of Lithography. Good serviceable stones have usually a yellow or bluish-grey colour, are compact and uniform in texture, and free from veins, flaws, and spots that would interfere with the delicate lines of the lithographer. (Watt's Dy.)

Lithographic stones from the following places are exhibited :—

1. Kurnool district, 2. and 3. Kistna district, 4. Europe and 5. Kudligi, Bellary district.

SERPENTINOUS LIMESTONES AND MARBLE.

These are limestones with included serpentine. Marble made of these limestones are coloured green and yellow on account of the included serpentine. They make very good decorative stones for building purposes.

Serpentine is a hydrous magnesium silicate and contains more water but less silica than talc. Iron peroxide is generally present in varying proportions and there are traces of other colouring matters which give to it its varying and beautiful hues.

Hence limestones with included serpentine have varying colours and are adopted for decorative buildings.

Marble is only polished limestone with smooth surface. Marbles frequently exhibit a variety of colours in veins and blotches. There are unicoloured marbles, such as pure blacks and whites and particoloured sorts due to the presence of accidental minerals, metallic oxides or from shells, corals, encrinites and other organisms which impact a variety of figure as well as of hue. (Watt's Dy.)

The following are exhibited from different localities :—

1. Marble used for sculpture from the Fort Church, Madras.
2. Serpentinous limestone from Rayalcheruvu, Anantapur.
3. Slab of marble from Ambasamudram, Tinnevelly.

BUILDING AND DECORATIVE STONES.

The building stones of Southern India are all brought together and arranged in two series in the second hall. The first series include all the stones employed for ordinary building purposes. They are arranged in two shelves placed at the two corners on the entrance side of the hall. The Stone is represented in the form of small cubes measuring from $4\frac{1}{2}'' \times 4\frac{1}{2}'' \times 4\frac{1}{2}''$ to $2\frac{1}{2} \times 2\frac{1}{2} \times 2\frac{1}{2}$.

They are arranged according lithological characters as igneous rocks, limestones, sandstone and etc., and have numbers painted on them. Reference to the numbers is given in the catalogue.

The second series include the more important of those on the shelves and others which are used for decorative and sculpturing purposes. They are arranged in small show cases along the breadth of the hall on the entrance side between the shelves. Some of these are from the palace of the Maharaja of Mysore.

General Introduction with reference to the building stones exhibited in the Museum.

Granite.—Granite as its name implies is a rock made up of granular particles. These grains are crystalline individuals of three or more kinds of minerals. They are united firmly together by their intergrowth to form a rigid rock. Granites show many variations of colour, texture, and strength but they all consist of the same essential minerals, namely, Quartz, Felspar and Mica. Frequently some of the rhombic pyroxenes like hornblende or Augite are present in place of, or in addition to, the Mica. The texture of the granite depends upon the coarseness or fineness of the grain, the disposition of the several minerals forming the rock, and their mutual relationships. The colour or the appearance of granite is the quality which perhaps more often than any other determines the selection of the stone. There are dark red, red, pink, flesh colour, greenish and gray granites.

The dominant colour of granite is nearly always determined by that of the felspars but this is modified by the colour and disposition of the other minerals, the quartz, mica, hornblende, tourmaline, etc. The appearance of granite is brought about by the several effects produced by the state of aggregation of the minerals. Polishing and rubbing produce always a darker colour effect than fine axing. The Specific Gravity varies from 2·6 to 2·8. Weight per cubic feet 160 to 200 pounds. Resistance to pressure usually from 1,000, to 2,200 tons per square foot. Granite occurs in viens in the Coimbatore and Salem districts, in the low country especially in the Sankaridrug. A strong band of very coarse granite veins occurs in the Trichinopoly district of the left bank of the Cauvery river. Granite also occurs in Nellore, Dhone in Kurnool and near Gooty in Bellary district.

Granite—*Coimbatore.*—No. 1, Maruthamalai.

2. **Gneiss.**—The gneisses of South India are mostly of igneous origin. They are Archæan in age. The chief districts where they are found are Madras, Nilgiris, Salem, Coimbatore, South Arcot, Madura, Tinnevelly, Kistna, Ganjam and Vizagapatam. The following minerals are found in members of the different kinds of gneisses, Quartz, Microcline, Labradorite, Augite, Hornblende, Biotite, Iron ores and pyrite. The name charnockite is restricted to the group of hypersthene bearing rocks. The other kinds of gneisses are Biotite Gneiss where Biotite is dominant, garnetiferous gneiss where garnet is largely formed, granitoid gneiss, where it is more like a granite, Hornblende gneiss where Hornblende is dominant, and Syenitic Gneiss where it is more like Syenite. Gneisses in general and charnockite in special are adapted very well for building purposes. In the Nilgiris there are several places where excellent building stones could be obtained. In Mysore a variety is obtained which can split into posts 20 feet long which are used as posts for supporting telegraph wires In Pallavaram, a place 10 miles from Madras, the charnockite is largely quarried for building purposes. In the Nellore and Kistna districts, gneiss is used for making cart wheels.

The gneiss is valuable in that it is peculiarly susceptible to fine carving. Examples of buildings built with biotite granite rock are the High Court, the Law College and the Napier bridge.

Examples of buildings where charnockite has been used—

The High Court, Connemara Library and the Technical Institute.

The following are samples of building stones made out of gneisses from different localities of South India :—

1. **Charnockite**—

Chingleput.—No. 2, Pallavaram.
Nilgiri.—Nos. 3 and 4, Ootacamund.

2. **Gneiss**—

Ganjām.—Nos. 5, Russellkonda Reservoir quarry (1).
6, Ranipeta quarry (2).
7, Ambogoda quarry (3).

Vizagapatam.—No 8, Hanumantavanka quarry.

Gōdāvari.—No. 9, Dowleshwaram.

Nellore.—Nos. 10, Ammavaripalem (1).
11, Narasimhakonda quarry (2).
12, Darsi hill (3).
13, Marlapudi (4).

North Arcot.—No. 14, Pundi quarry.

South Arcot.—No. 15, Mailam.

Salem.—Nos. 16, Pandian Karadu near Tiruchengodu (1).
17, Kuppam quarry (2).

Coimbatore.—No. 18, Udamalpet.

Trichinopoly.—Nos. 19, Mattaparai quarry (1).
20, Katchandi hills (2).
21, Kalpalaiyam (3).
22, Kallagudi (4).
23, Sundarkaiparai, south of Kulittalai (5).
24, Puduppatti quarry (6).

Madura.—Nos. 25, Thengalapatti quarry (1).
26, Parayanbarai near Tirupparankundram (2).
27, Anamalai (3).
28, Mattapparai (4).
29, Somagiri hill (5).
30, Uthamapalaiyam (6).
31, Vandiyur perumbarai (7).
32, Virachiparai (8).
33, Dindigul (9).
34, Miladamparai, Palni town (10).

Rāmnād.—No. 35, Puduparai.

Tinnevelly.—Nos. 36, Sorithaparai (1).
37, Nambian Parambu (2).
38, Sivalepperi (3).
39, Minatchipatti quarry (4).
40, Sillanattam quarry (5).
41, Pattakurichi near Tenkāsi (6).
42, Kadambur quarry (7).

Gneiss, decomposed—

Ganjām.—Nos. 43, Padamapur quarry (1).
44, Golapanda quarry (2).

Vizagapatam.—No. 45, Nellimasla quarry.

Trichinopoly.—No. 46, Solanganallur.

Gneiss, biotite—

Guntūr.—No. 47, Gundlapalem.

Madura.—No. 48, Sithermalai, near Perani.

Gneiss, garnetiferous—

Kistna.—No. 49, Golabanda Mekalabanda near Kondapalli.

Guntūr.—No. 50, Chintabander, or Sattenapalli Road.

Madura.—No. 51, Chittampatti.

Tinnevelly.—No. 52, Perandimalai Pothai, in Kallikulam village.

Gneiss, decomposed garnetiferous—

Ganjām.—Nos. 53, Doctor Metta (1).
54, Boyee Hills (2).

Kistna.—Nos. 55, Vasantharayudu Thippa near Kothuru (1).
56, Mogalrajapuram (2)
57, Bezwada quarry (3).
58, Vadlukonda near Jaggampudi (4).

Guntūr.—No. 59, Sithanagaram quarry.

Gneiss, granitoid—

Guntūr.—No. 60, Vinukonda hills.

Nellore.—No. 61, Kanigiri.

Bellary and Anantapur.—Nos. 62 and 63.

Chittoor.—No. 64, Cherulopalli quarry near Palmanair.

North Arcot.—No. 65, Sholinghur quarry.

Coimbatore.—No. 66, Savanampatti.

Trichinopoly.—No. 67, Puthur Karadu quarry.

Madura.—Nos. 68, Anamalai.
69, Swamimalai quarry near Dindigul.

Rāmnād.—No. 70, Sirumalai.

Tinnevelly.—Nos. 71, Pothaiyadi Pothai, Pappankulam village (1).
72, Rajakkalmangalam Pothai (2).

Gneiss, granitoid garnetiferous—

South Arcot.—No. 73, Gingee.

Gneiss, hornblende—

Ganjām.—Nos. 74, Devabhumi quarry (1).
75, Dangam quarry (2).
76, Bitchatailla quarry (3).
77, Benakunda quarry (4).

Bellary and Anantapur.—No. 78 (1).

Salem.—No. 79, Hill, near the Varattar in Attipati limits.

Trichinopoly.—Nos. 80, Mulaguparai, near Uriyur (1).
81, Solamparai, near Uriyur (2).
82, Gopalapuram quarry (3).
83, Pachamalai hills, in Okkarai village (4).
84, Pachamalai hills, in Nagalapuram village (5).
85, Esanai quarry (6).

Madura.—Nos. 86, Periyar, right bank of Periyar dam (1).
87, Vadipatti hill quarry (2).
88, Waterworks quarry, west of Periyakulam (3).
89, Anamalai quarry (4).

Tinnevelly.—Nos. 90, Valegan Pothai, near Tenkasi (1).
91, Ambasamudram Pothai (2).

Gneiss, syenitic—

North Arcot.—Nos. 92, Sholinghur quarry (1).
93, Arni quarry (2).

Coimbatore.—Nos. 94, Puliyakulam, near Coimbatore (1).
95, Nitaparai (2).
96, Kinathukkidavu (3).

Limestones.—The limestones that are used for building purposes include nearly every one of the many varieties in which the stone occurs, The essential characteristic of a limestone is the presence of a large proportion of carbonate of lime ($CaCO_3$) in its composition. In the purer varieties the amount of $CaCO_3$ ranges from 80 to 98 per cent of the mass ; impure forms may contain as little as 30 per cent or less, and these grade into calcareous sandstone or mud stone where the amount of Silica or mud begins to predominate over the lime. Limestones vary in texture as much as they do in composition. We get hard and compact limestone as well as soft and friable limestone like the chalk. Limestone are formed in two ways, namely, organically and chemically. Organically formed limestones are more numerous than chemically formed lime stones. The organically formed limestones may be classified according to the agents which went to make them as shell lime stones, crinoid limestones, foraminiferal limestones and coral limestones. The chemically formed limestones include the Tufa or Travertine, the Oolitic limestones and the crystalline varieties of limestones such as dolomite, calcite, and the Magnesia limestones.

Colour of the limestones.—The limestones present a wide range of colours. There are limestones passing from black through every shade of grey, to sparkling or dull white or from a pale green tint through yellow, brown and orange to a red tint. The different colours are due to the presence of iron oxides, carbonaceous matter, serpentine, etc.

Marbles.—Marbles are used for decorative purposes in buildings. They are lime stones of dolomites that by some process or alteration of metamorphism have been completely crystallized or recrystallized. In such rocks all original structures are completely obliterated. Many calcareous and magnesian carbonate rocks capable of taking polish are also popularly called as marble, although they are not so completely altered as to be true marbles in the geologic sense.

Limestones exhibited in the Museum are obtained from the following districts :—(1) Cuddapah, (2) Kurnool, (3) Kistna, (4) Guntūr, (5) Coimbatore, (6) Trichinopoly and (7) Tinnevelly.

1. **Cuddapah Limestone.**—The formation of the rocks in this district belong to the Cambrian and Silurian periods. The limestones are very hard and good for building purposes. See No. 97, Pushpagiri (1).

2. **Kurnool Limestone.**—The rocks here also are Cambrian and Silurian. The limestones furnish a very good building material. See No. 98, Kalluru quarry (1).

3. **Kistna Limestone**—The rocks here are not younger than carboniferous in age and are very probably Cambrian and Silurian. The limestones from Jaggayyapetta are very good building stones. See No 99, Jaggayyapetta (1).

4. **Guntur Limestone**—The limestones are quarried to a large extent in this district. The rock is very good as a building material.

100. Mittagudipadu near Rentachintla (1), 101. Rentachintla (2), 102. Mattigudipadu (3), 103. Atmakuru quarry (4), 104. Tallapad quarry near Macherla (5), 105. Tallapad south east of Macherla (6) and 106. Gollakunta south of Macherla (7).

5. **Coimbatore Limestone.**—Crystalline limestones fit for building purposes is obtained here near Madukaray. They are Cambrian in age. They underlie rocks of the cretacious period and are metamorphic in character. See Nos. 107 and 108.

6. **Trichinopoly Limestone.**—The rocks of this place belong to the cretacious formation. They are quarried to a large extent for the construction of small village temples and rest houses. The samples exhibited are from Varagapudi and Perali. See Nos. 109 and 110.

Tinnevelly Limestone.—These are coral limestones (organic in origin) which are recent formations. They are used for rough building purposes by the people of Tuticorin. See No. 111, Tuticorin (1).

Kunkur.—Under special climatic conditions carbonate of lime is derived mainly from lime felspars and deposited in the same place or in remote places from the place of origin. In some places it is found in the soil. Lime felspars in Coimbatore are dissolved in rainy seaon and carbonate of lime is left. Lime obtained in this manner is called Kunkur. Kunkur stone is adapted for building. The sample is from Guntūr. See No. 112, Vinukonda hills (1).

Cuddalore Sandstones.—Sandstones are rocks in which sand is the predominating element. They are formed in rivers, streams and oceans. They show the bedding of the formation more clearly than any other aqueous formation. The rocks called Cuddalore sandstones belong to a recent period. They extend over a pretty large area in the Carnatic from Gōdāvari to Tanjore. They are very well seen in the following places, namely, Gōdāvari, Nellore, Madras, South Arcot and Tanjore. They overlie the cretaceous rocks.

The sandstones of the Cuddalore group are quarried to a small extent in the places where it is found. The stone is compact, moderately fine in grain and being jointed in two directions is easily quarried. It is worked for being converted into rice mortars and water troughs. It appears to be well adapted for building.

1. *From Godāvari*—See Nos. 113—123, Dowleshwaram (11).

2. *From Nellore*—See Nos. 124, Rajapalaiyam (1), 125. Tada (2).

3. *From South Arcot*—See No. 126, Nachiyarpettai (1).

Calcareous Sandstones.—These are Sandstones in which there is a large mixture of lime. The calcareous Sandstones of Tinnevelly which are exhibited in the museum are unquestionably marine in origin. They are subaerial and subrecent deposits. These sandstones are well adapted for building and largely used for this purpose in this district.

From Tinnevelly—See Nos. 127. Panamparai quarry (1), 128. Tuticorin (2). 129 and 130. Kallanguli quarry near Tiruchendur (304).

Laterite.—This is a rock which is reddish brown in colour and consists of varied mixtures of sand, clay and rock debris with abundant iron oxide cement. Laterite rocks are to be found on the East Coast, especially near Madras and in great abundance on the West Coast, in the Malabar district, Travancore and Konkan. There are various views held with regard to the origin of these rocks. Laterite of the East Coast are sedimentary in origin. In the Western Ghats the laterite formations seems to have been due to decomposing vegetation which aided by a hot damp climate has caused concentration of the iron in the soil.

Malabar Laterite.—There are two chief varieties namely the vesicular and the pellety varieties. Vesicular laterite is a ferruginous hardened clay, penetrated by numerous, vermicular, branching and anastomosing tubes. The walls of the tubes contain a large proportion of iron.

The Pellety laterite is usually much more solid than the other and consists of small irregular nodular looking pellets of red oxide of iron cemented together by similar material.

The laterites overlie old rocks such as gneiss and underlie recent deposits. They are themselves comparatively recent.

Laterites supply the most useful building materials. But laterite does not present a very good appearance.

From Nellore—See Nos. 131. Mulapet, Nellore quarry (1) and 132. Talamanchi quarry (2).

From Malabar—See Nos. 133. Cannanore Cantonment (1), 134. Chevayur, near Calicut (2) and 135, Mallaparamba, near Calicut (3).

Trap.—Trap is the general name for the igneous rocks which include Basalt, Dolerite, Diorite, etc. It is extensively formed in the Deccan. On account of such basaltic accumulations, the soil in these places is very rich and fit for crops like cotton. Trappean rocks have been used from a long time for tempie building and particular architectural or religious sculptures throughout India. Like granite, it is easily worked by the stone carver. See No. 136 Deccan trap from Dhowleswaram, Gōdāvari district.

Quartz.—This is a mineral which occurs in both amorphic and crystalline forms. It is one of the hardest minerals (hardness 7).

It is silicon dioxide in chemical composition. It is a very hard and compact stone so that it is very well adapted for building purposes. The sample is from Pudukottah quarry, Tinnevelly district, No. 137.

The second series of building stones exhibited in glass show cases and along the wall on the floor.

(1) A block of granite from Dammuru, Bellary district.
(2) A block of granite from Adoni, Bellary district.
(3) Granite and porphyry.

Varieties of stones used in the Maharaja's Palace at Mysore. Details as to localities of these stones are mentioned in the label attached to the case.

(4) Granite and porphyry.

Building stones used for decorative purposes in Mysore State. Details as to localities of these stones are mentioned in the label attached to the case.

(5) Two large pieces of charnockite from Coonoor, Nilgiri district.

(6) Four large pieces of marbles arranged along the wall near the second shelf—From Madukarai, Coimbatore district.

(7) A piece of syenite granite placed along the wall on the floor near the second shelf from Madura.

Books consulted :

I. Memoirs of the Geological Survey of India—

(1) Vol. 4, pt. 1—on the cretacious and other rocks of the Trichinopoly and South Arcot districts by Blanford.

(2) Vol. 4, pt. 2, on the Geology of parts of the districts of Salem, Trichinopoly, Tanjore and South Arcot, by King.

(3) Vol. 8, Geology of Cuddapah and Kurnool, by King.

(4) Vol. 20, Geology of Madura and Tinnevelly, by Foote.

(5) Vol. 24, pt. 3.—The Geology of South Malabar between Beypore and Ponnani rivers, by Philip Lake.

(6) Vol. 25, Geology of the Bellary district, Foote.

(7) Vol. 28, pt. 2, Charnockite Series, by Sir T. Holland.

II. Building stones. British and Foreign, by Watson.

III. Geology of building stones, by Howe.

IV. Dr. Watt's Dictionary of Economic Products.

GLASS.

Exhibits connected with the manufacture of glass at Madras Glass Works, 1911.

About glass in general.

All the glasses, whether soda-water bottle, mirror, tile, or window glass are but amorphous compounds of various silicates obtained by a process of melting and shaping. Glass consists essentially of a base i.e., sand, an alkali, being a carbonate or sulphate of sodium (and rarely potassium or barium) and a flux which is an oxide of lead, calcium or iron and in special cases borax. In addition to these primary ingredients others are often added ; for example Arsenic trioxide shown among the exhibits is used as an oxidising agent. Charcoal which is also exhibited is used to reduce sulphates when present. Clay or magnesia makes glass hard and resistant and greatly raises the melting point.

The manufacture of glass falls into two parts namely the melting of the glass and the working of the glass. For the melting purpose special furnaces are built. For the working of the glass, there are automatic machines. In the beginning the Madras Glass Works, manufactured soda-water bottles by blowing with the mouth. But this is too laborious a process and it is terribly slow. For further information on glass and its manufacture reference may be made to bulletins published by the Department of Industries, Madras on glass. (Bull. Nos. 14 and 25, Department of Industries, Madras.)

The Madras Glass Works employed the following materials which are exhibited :—

(1) Coarse and sifted sand from Ennore. This contains only ·125 per cent of iron and is therefore very good.
(2) Sodium sulphate and carbonate is the alkali for the glass.
(3) Charcoal to reduce the sulphate.
(4) Arsenic trioxide which is used as an oxidising agent.
(5) Lime which forms the flux.

A soda-water bottle and a tile manufactured by the Madras Glass Works are also exhibited.

Exhibits connected with the manufacture of glass bangles in Kālahasti, Chittoor district.

The manufacture of glass is confined to a few villages in the Kalahasti Zamindari where the saline efflorescence of the soil is abundant. The local people call it "soude man." This is collected generally in February and March and placed in pots holding 6 measures of it each. Sixty of these are built into a large clay furnace and baked for some time until the contents are fused into a white glass called "Gazu rai." The soil mixed with soda is found to supply the necessary amount of quartz. The gazu rai is powdered and mixed with various substances to give its colour. Copper filings make it green, a black stone, obtained from Conjeeveram produces a blue red. A blue powder which is said to be obtained gives the gazu rai, a blue colour. The coloured glass is again broken, fused once more and bent with an iron style into the shape of bangles.

The industry is in the hands of the Balija caste. (Manual of North Arcot Dt.—Cox and Stuart.)

PENCILS, ETC.

Pencil manufactured in Madras.

For complete information on the subject, please refer to Bulletins Nos. 13, 15, 23 and 24, published by the Department of Industries, Madras. The timber used for making pencils is Juniperus procera (East African Cedar) which belongs to the natural order Conifereæ. As shown in the photographs, the timber is cut into boards. Grooves are made in the boards by means of machinery. The grooved boards are afterwards glued. The graphite used for the pencil is obtained in the forms of ores. The ore contains a large amount of impurity. The graphite is therefore refined in the following manner. Graphite ore is powdered and passed through a 100 sieve. The fine material is then mixed with liquid fuel in the proportion of 35 lb. of ore to 1 gallon of fuel. The mixture is then placed in a wash-box which consists of an ordinary rectangular box the bottom of which has a 60 mesh sieve. Water is allowed into the box so that it just overflows and the plastic mass is well agitated. The water overflowing at the top carries off the fine impurity. Much of the water escapes through the bottom and this carries away the heavier particles. Washing is continued until the wash water comes off fairly clear. The graphite so washed is No. 2 quality. This washed water is collected in a large wash tub. Some graphite is usually found floating about it. This is scummed off and added to No. 2 residue. Still finer qualities of graphite can be obtained by subjecting No. 2 for further washing. No. 2 grapite is usually used for all ordinary pencils.

The lead used in making pencils consists essentially of a mixture of finely ground graphite and clay. Great care must be taken to see that the graphite and clay employed do not contain any impurities. If the mixture contains small quantities of aluminium, silicon, and magnesium dioxide, it does not matter very much. But if it contains impurities such as calcium and iron, it greatly injures the quality of the lead.

Fluxes are employed to cause the material to cohere and of all the fluxes, borax is the best. "As regards the mechanical treatment, the ordinary method of preparing lead is to mix the ingredients and run them through a mill a certain number of times. The fluxes are then added and further grinding is done. The material is finished up in a roller mill and then transferred to the press where it is squeezed through a small aperture under pressure." The lead is afterwards dried and protected from being exposed to violent changes of temperature. The lead is now baked in which process the ingredients are all fixed. A finish can be given to the lead by immersing it in a bath of oil or wax. The lead is now ready to be put into the grooved board and to be made into pencils.

The following are the articles exhibited in connexion with the manufacture of pencils :—

1. Slat, plain.
2. Slat, grooved.
3. Slat, with leads.
4. Sandwich ends, not cut.
5. Sandwich ends, cut.
6. Half rounded partly.
7. Half rounded fully.
8. Full rounded.
9. Passed through full rounding machine.
10. Passed through papering machine.
11. Papered and one end trimmed.
12. Both ends trimmed and stamped.
13. Graphite ores.
14. Cakes ready for drawing into leads.
15. Graphite crushed.
16. Drawn leads unbaked.
17. Refined powder.
18. Drawn leads baked.
19. Sieved powder.

Photographs—

1. Sawing boards.
2. Grooving boards.
3. Glueing-grooved boards.
4. Grinding lead.
5. Cutting pencils.
6. Finishing pencils.

Slate and Pencils made from the wood of Gmelina arborea, Roxb., *Kistna district.*

Gmelina arborea, *Roxb.* N.O. Verbenaceæ.

Tam. Gumadi, Cummi.

Tel. Gumar-tek, Peddagomru, Tagumuda, Gumudu.

Hind. Gumbar, Kumar, Gambari, Sewan, Shewan.

Kan. Shwami, Kuli.

Trav. Hills. Kumala.

This is a moderate-sized or large deciduous tree. This is found throughout South India especially in deciduous forests. It is not found in very dry places. The wood is easily worked and readily takes paint or varnish. It is very durable under water. It is used for making pencils, toys, packing cases, boats, etc.

The following are the exhibits :—

Gmelina arborea.—piece of the wood.

Pencils.

Slate and pencils made from the wood of Givotia rottleriformis, Kistna District.

Givotia rottleriformis, *Griff.* N.O. Euphorbiaceæ.

Tam. Vendale, Butalli, Bulaly. *Tel.* Tella Punki, Tella Puliki, Petiri Puliki.

A moderate-sized tree. It is found like most of the Euphorbiaceous plants in the dry districts of South India. It is common in the Carnatic and Mysore. The wood is put to many uses. It is employed for making pencils, toys and other fancy articles. It is also used for carving figures and making catamarans.

The exhibits are :—1. Pieces of wood of Givotia rottleriformis and 2. Pencils made from its wood.

MYSORE GOVERNMENT MUSEUM,
BANGALORE.
No .....
Date.....

ACC No. 5590

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